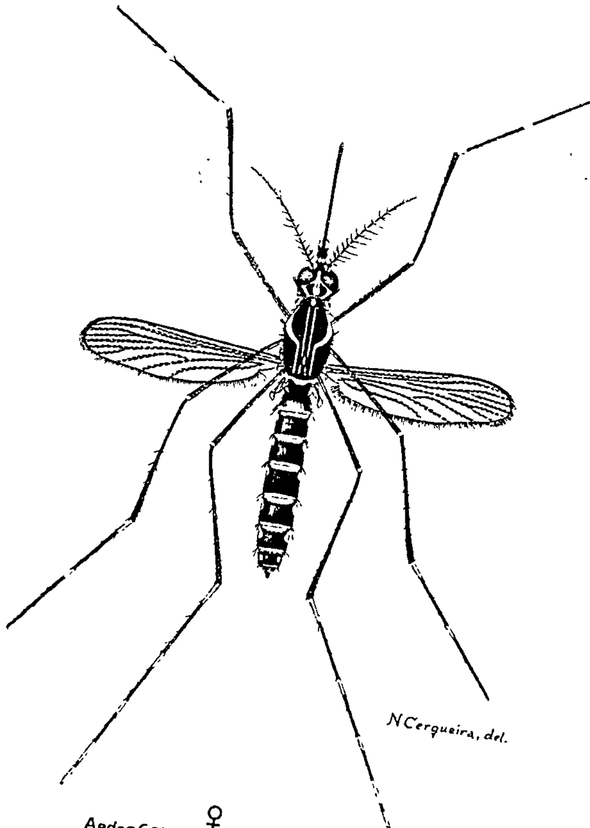
ANTI-AEDES AEGYPTI MEASURES IN BRAZIL



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Aedes (Stegomyia) aegypti

The Organization of Permanent Nation-Wide Anti-Aedes Aegypti Measures in Brazil

By

FRED L. SOPER, D. BRUCE WILSON, SERVULO LIMA, AND WALDEMAR SÁ ANTUNES

This report is based on the work of the Cooperative Yellow Fever Service maintained jointly by the Brazilian Government and the International Health Division of The Rockefeller Foundation for eleven years, 1929–1940

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"I should like to take this opportunity of repeating to Doctor Soper the request I have already made to him and to Doctor Sawyer that The Rockefeller Foundation be asked to publish an account of the antimosquito organisation.

"I am generally familiar with mosquito control but that which I saw in Brazil a couple of years ago, in connection with anti-yellow fever work, was something quite beyond my experience. I feel sure that The Rockefeller Foundation would be doing a real service if they would give a detailed account of the wonderful work and wonderful organisation which exist in Brazil. I hope Your Excellency[1] will also press for publication of what the Brazilian Government has done, so that in other countries men who are faced with the problem of mosquito control will have this invaluable guide."

SIR MALCOLM WATSON[2]

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FOREWORD

No greater eulogy of the antimosquito work in Brazil could be written than that expressed in the words of Sir Malcolm Watson, the only remaining member of the famous group of masters of the first generation of medical health officers who in the early years of the present century devoted themselves to the development of methods for the protection of human populations from the ravages of mosquito-borne disease. That Sir Malcolm's repeated request, which stands for us as a command, has not been satisfied previously is due in great part to the urgency of modifying the anti-aegypti technique for application in a new field, that of anopheles control, in which Sir Malcolm has gained so many laurels. The campaign for the eradication of the African *Anopheles* (*Myzomyia*) *gambiae* from Brazil is now concluded[1] and we hasten to comply with the request for a description of Brazilian methods.

However, before presenting this description we would call attention to the fact that it is neither a description of the work and organization as Sir Malcolm saw it in 1936 nor yet as it is today (1942), but rather as it was in 1940 at the time the Brazilian Government assumed entire responsibility for the program. Conditions are constantly changing, and there is much still to be learned about how mosquito-borne disease can be controlled permanently and economically. The methods here described should not be considered final but only as the stage of development reached in Brazil after an exceptional opportunity for work over a long period of time throughout an enormous area in which conditions varied greatly from region to region, with adequate funds, personnel, and authority, on the most fascinating problem of pitting human intelligence and perspiration against the instinct and persistence of the aegypti mosquito. The victory has not been always on the side of intelligence and perspiration, and defeat has been due to limitations of one and the other; but a technique has evolved finally which, under Brazilian conditions at least, makes possible the eradication of *Aedes aegypti* with a minimum of both.

FRED L. SOPER
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WALDEMAR SÁ ANTUNES

[1] "Species Eradication. A Practical Goal of Species Reduction in the Control of Mosquito-borne Disease," by F. L. Soper and D. B. Wilson, *Journal of the National Malaria Society*, 1: 5–24, 1942.

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HISTORICAL INTRODUCTION

When the medical historian of the future comes to write the chapter on yellow fever, he will be obliged to devote considerable space to the developments of the decade and a half from 1926 to 1940. This short period showed how impossible of fulfillment was the dream of final eradication of yellow fever, but it saw great advances [illegible]

covery of the virus origin (1), the demonstration that mosquitoes other than *Aedes aegypti* can and do transmit the virus (2, 3), the development of the protection test for determining immunity (4), the organization of viscerotomy for the diagnosis of unsuspected fatal cases (5), the proof that unrecognized yellow fever has been widespread in large silent endemic areas of South America and Africa (6, 7), the demonstration that the disease exists in many countries of South America as one of jungle animals, independent of the distribution of *Aedes aegypti* and of man (8), and finally the modification of the yellow fever virus in such a way as to make mass vaccination practicable (9). These outstanding developments have tended to overshadow the more prosaic improvements in the organization of measures against the aegypti mosquito in Brazil which have transformed expensive temporary aegypti-reduction campaigns for the eradication of yellow fever into economical permanent services for the species eradication of *Aedes aegypti* itself from the infested areas.

When the period under consideration began, those active in the study and control of yellow fever anticipated its early disappearance from Northeast Brazil, the only recognized endemic region remaining in the Americas. All other foci of aegypti-transmitted yellow fever had disappeared in the face of antimosquito campaigns organized by The Rockefeller Foundation in collaboration with the national governments concerned. The 1926 outbreak of yellow fever in the Brazilian states of Paraíba, Pernambuco, Baía, and Minas Geraes, which occurred in spite of the antimosquito campaigns carried out in the principal population centers in 1923, was the first clear-cut recognized failure of such campaigns to rid any region of yellow fever.

The period under discussion ended in 1940 with the seventh and last of a series of annual shifting epidemics (10) of jungle yellow fever (1934–40) which swept the forested areas of southern Mato Grosso, Goiás, Minas Geraes, São Paulo, Paraná, Santa Catarina, Rio Grande do Sul, Rio de Janeiro, and Espírito Santo, involving also Paraguay and almost certainly part of the Province of Misiones, Argentina. Jungle yellow fever had also been registered, quite independently of this epidemic sweep, in southern Baía, in eastern Minas Geraes, in Maranhão, and at widely scattered points in Amazonas, Pará, and Acre During this decade and a half aegypti-transmitted yellow fever was reported for all Brazilian states except Rio Grande do Sul, Santa Catarina, and Espírito Santo, but even these states had seen cases on board ships arriving in their principal ports. But several of the observed outbreaks were secondary to jungle yellow fever, and available data indicate that epidemiologists were justified in believing in 1926 that the only area of permanent aegypti-transmitted endemicity lay in Northeast Brazil, between and including the States of Baía and Piauí. There is ample evidence, including the [illegible]

1928–29 and the subsequent wide distribution of aegypti-transmitted yellow fever in 1928 and

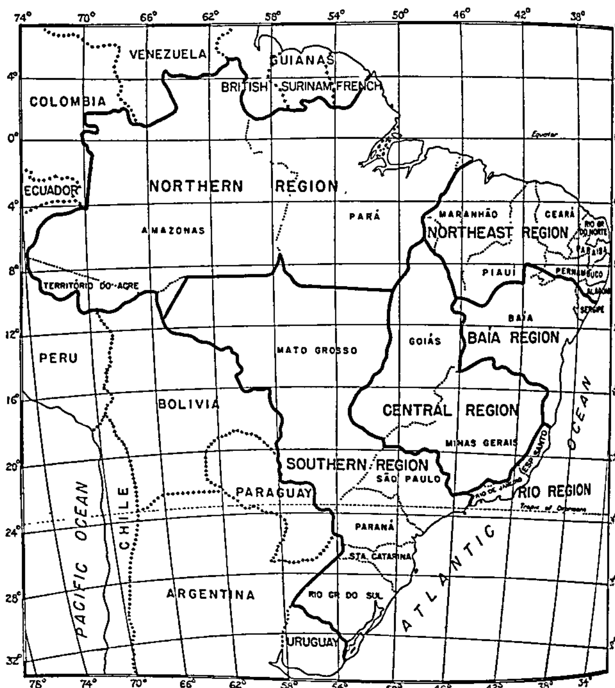


Fig. 2. Map of Brazil, showing regional organization of anti-aegypti work.

1929 were due probably to an invasion by virus from jungle areas. If this be true, the Rio de Janeiro outbreak of 1928 was but another in the series of transfers of jungle yellow fever virus to towns and cities, followed by aegypti-transmitted outbreaks, which included those of Socorro, Colombia, in 1929; Guasipati, Venezuela, in 1929; Santa Cruz de la Sierra, Bolivia, in 1932; Teófilo Otoni, Minas Geraes, in 1935; Cambará, Paraná, in 1936; Buena Vista, Colombia, in 1937; and Senna Madureira, Acre, in 1942. Today even those who were at first most skeptical of the existence and importance of jungle yellow fever are forced to recognize the permanent threat of invasion from this source hanging over towns and cities which permit high densities of aegypti

ding to persist in these days of rapid transation linking all parts of the Americas.

1931–32 it was shown that the permanent pti-transmitted endemicity of Northeast zil was different from that observed elsere in the Americas, in that it was based in on the rural distribution of *Aedes aegypti*, ch was able to maintain yellow fever virus he rural populations for long periods after elimination of yellow fever from the larger ters of population. This rural endemicity responsible for the failure of previous camns to eradicate yellow fever from Northeast zil, where jungle yellow fever does not occur.[1] al endemicity persisted until control measures applied throughout large rural areas. These sures were crowned with success, and since ust 1934 no focus of yellow fever infection been found in Northeast Brazil. In fact no pti-transmitted yellow fever has been seen razil since 1934, with the exception of a few ted outbreaks appearing in conjunction with l outbreaks of jungle yellow fever. All such pti-transmitted outbreaks have been overe before secondary foci of aegypti-transted yellow fever have developed. The Naal Yellow Fever Service of Brazil, however, gnizes that all outbreaks of aegypti-transted yellow fever are unnecessary and refuses e satisfied with the past record. In spite of development of an effective vaccine which is g widely used to protect populations exposed the jungle infection, a nation-wide antiypti service is maintained to prevent the smission of the virus by *Aedes aegypti*.

he period 1926–40 showed that temporary -center anti-aegypti campaigns would not dicate yellow fever from Brazil, but it witsed the development of methods whereby domestic vector itself may be eradicated, r which permanent sentinel services can ly prevent reinfestation with this species. ereas in 1926 anti-aegypti measures were g applied in a clumsy, expensive, and comatively ineffective manner in a few cities of Northeast Brazil at the expense of the International Health Division of The Rockefeller Foundation, the year 1940 saw the return to government control at government expense of a streamlined National Yellow Fever Service operating throughout the entire country, conscious of its direct responsibility for the occurrence of any aegypti-transmitted yellow fever, and *willing to declare its program to be the eradication of* Aedes aegypti *from Brazil.*[2]

The eradication of *Aedes aegypti* from such a large and highly favorable habitat as Brazil is not so utterly impossible as it must appear to those who have combatted this mosquito with methods which failed to wipe out the species in the communities worked Once eradication has been attained in the larger centers of population (Figs. 3, 4) it soon becomes apparent that ease in keeping these centers free of infestation depends on the absence of the mosquito from the towns, villages, and even rural districts of the tributary regions. Fortunately the difference in expense between maintaining a safe density of *Aedes aegypti* in a city and keeping the same city completely free of this species is so great that the cost of clearing contiguous areas of the mosquito to protect a zero index is more than justified over a period of years. Thus any program of species eradication tends to expand automatically to include even the smallest and most distant places, until the entire region is cleared of the species.

It will undoubtedly seem to many that the methods described in the following pages are unnecessarily detailed, that entirely too much record keeping is involved, and that undue attention is given to checking the work reported. The answer is in the results obtained. Detailed records and maps pay for themselves many times over if they are studied and if they are used to orient an ever-shifting strategy of campaign against the *Aedes aegypti*. Human nature being

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[1] Jungle yellow fever has been observed in southern and in Maranhão, but in none of the intervening s Sergipe, Alagôas, Pernambuco, Paraíba, Rio Grande Norte, Ceará, and Piauí.

[2] Regulations of the National Yellow Fever Service of the National Department of Health: Decree No. 8675 of February 4, 1942: "Article 10: Incumbent upon the Section of Stegomyia Control shall be: (a) the study and preparation of plans for the control of the stegomyia mosquito (*Aedes aegypti*) by the field services, looking toward the complete eradication of this species."

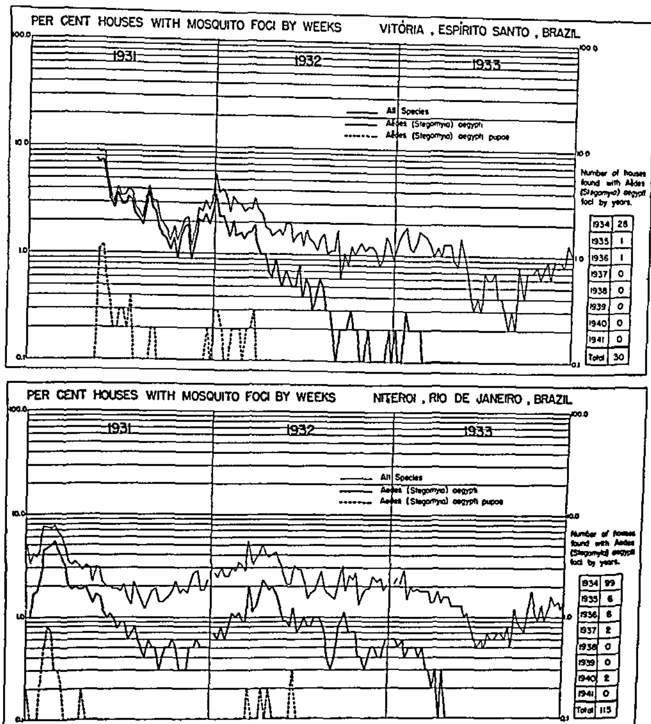


Fig. 3. Results of aegypti eradication programs in the cities of Vitória and Niteroi in Eastern Brazil.

what it is, the expenditure of 25 to 30 per cent of the labor budget for checking the work done has proved sound practice in species eradication work.

The methods described must be considered as *the accumulated experience of many workers.* The Yellow Fever Service operating in Brazil under the auspices of The *Rockefeller Foundation* since October 1923 was amalgamated with *the Yellow Fever Service of the National* Department of Health in January 1932, and the consolidated service was able to take advantage

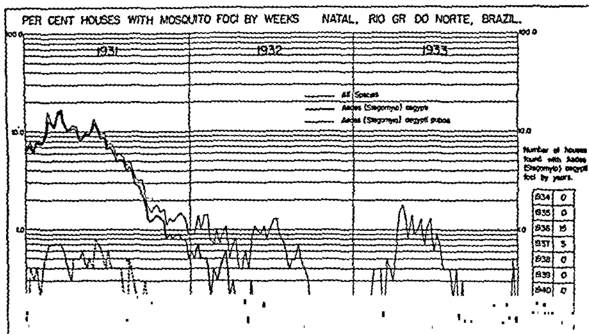


Fig. 4 Elimination of aegypti mosquitoes from Natal, in Northeastern Brazil.

of the ideas and methods developed by The Rockefeller Foundation under the influence of Gorgas and by the Brazilians under the influence of Oswaldo Cruz. In addition, the Service has not hesitated to borrow administrative procedure from purely business sources and has had many useful suggestions for modifications from its own subordinate personnel. There are probably few details of the methods described, including the search for hidden producing foci, the routine oiling of foci, and the capture of adult mosquitoes, which have not been used before. The real contribution which has been made has been the application of these methods in such a way as to attain species eradication of *Aedes aegypti*. Herein lies the greatest achievement of the Cooperative Yellow Fever Service of Brazil.

DESCRIPTION OF ANTI-AEGYPTI TECHNIQUE

INTRODUCTION

Following the unexpected outbreak of yellow fever in Rio de Janeiro in 1928, the Brazilian Government, realizing that the control of yellow fever is a national rather than a local problem, took steps which resulted in bringing under one administrative head, on January 1, 1932, all responsibility for the investigation and control of this disease throughout the country. These steps were:

1. Assuming early in 1929 partial financial responsibility for the Yellow Fever Service operating since 1923 in North Brazil under the auspices of the International Health Division of The Rockefeller Foundation.
2. Extending on December 1, 1930, the zone of operations of the Cooperative Yellow Fever Service to include all Brazil, except the Federal District.
3. Amalgamating on January 1, 1932, the Yellow Fever Service of the National Department of Health, operating in the Federal District, and the Cooperative Yellow Fever Service.

On May 23, 1932, Federal Decree No. 21,434 was issued giving the Yellow Fever Service adequate authority to carry out measures for the prevention of mosquito breeding and to investigate possible yellow fever cases occurring throughout Brazil (see pp. 129–133). No legal pro- [illegible] tions as might become necessary.

While it may be possible to organize small health services on the basis of word of mouth instructions, all details of established techniques must be written down for ready reference if uniform work is to be done on a national scale. The description of the technique of anti-aegypti work which follows is an adaptation of corresponding sections of the *Administrative Manual of the Yellow Fever Service of the Ministry of Education and Health of Brazil* as they were at the end of 1939. The Brazilian Yellow Fever Service is not static: modifications of technique are being tested constantly, and those found useful are adopted. And so it is that the Service Manual, in evolution since 1930, continues in a loose-leaf mimeograph form which is easily altered.

In the field of yellow fever control, to an even greater extent than in many other fields of public health administration, the literature on administrative details of the work is inadequate. In the special case of anti-aegypti work, all of the few reports available refer to emergency urban campaigns carried out for the purpose of getting rid of yellow fever, rather than to permanent programs for the eradication of the vector.

An essential difference between an emergency campaign and a permanent one is the attitude which must be taken toward cost. At the time of a yellow fever epidemic, or under threat of importation of the infection from near-by epidemic areas, adequate funds are easily obtained to prevent a public calamity, and the health officer is judged not by the amount of money spent but by the immediate results of the campaign. Once the threat of yellow fever passes, however, government authorities and the health officer begin to consider the question of expense, which is indeed heavy in comparison with other important health measures. The director of an emergency campaign must know how, regardless of cost, to reduce the density of *Aedes aegypti* rapidly to a point where yellow fever transmission becomes impossible, whereas the director of a permanent anti-aegypti service must be able to prevent

aegypti breeding at such a low cost that the expenditure can be carried by the annual budget. The experience of the Yellow Fever Service in Brazil shows that aegypti breeding cannot be controlled economically by the time-honored methods of simply reducing the intensity of such breeding; only when species eradication, beginning in the larger centers, is carried to the smaller towns, villages, and even rural districts of the surrounding areas, which would otherwise reinfest the larger centers, can *Aedes aegypti* be controlled at little cost. Fortunately a technique has been developed which makes possible the complete eradication of the aegypti mosquito at a reasonable cost from urban, village, and rural areas.

The Brazilian Manual is based on Brazilian conditions, which are sufficiently varied to include most of the problems to be found in other parts of the Americas. No attempt has been made to adapt the techniques described to African and Asiatic conditions, under which certain special problems are encountered.

[illegible]

ers in, and in immediate proximity to, human habitations. In practice, the discovery and elimination of the final traces of aegypti breeding are often difficult, not only because of the instinctive wiles of the aegypti mosquito, but because of the public relations and personnel problems inherent in any attempt to apply routinely even the simplest measures in hundreds of thousands of homes scattered over all Brazil.

The reduction of aegypti breeding to a point where yellow fever disappears from the towns and cities worked is relatively easy, as the dramatic results of early campaigns testify, but the complete eradication of the species in a given place is made difficult by the instinctive ability of the female aegypti to lay her eggs in every hidden inaccessible water container, by the ability of the aegypti egg to withstand desiccation for several months, and by the constant transportation of the species from unworked to worked areas (imagoes by boat and train, and larvae and eggs in portable water containers, such as the universally used clay water jars). However, local species eradication has been accomplished in all the large cities intensively worked in Brazil during the past decade, and wide regions, including several entire states, have been cleared of aegypti.

In using the technique described, it must be borne in mind that the work in any given place should undergo regular evolution and requires different types of organization for its various stages. Many of the methods, such as those of the Vacant House and Roof-Gutter Services, are necessary in the early stages of the campaign while the aegypti density is high, but can be discontinued later; others, such as those of the Adult Capture and the Producing Focus Services are of little value as long as considerable aegypti breeding continues to exist, but become invaluable during the final clean-up of an area. The most advantageous application of the technique is possible only when a careful current analysis of the progress of the work is used as the basis for timely modifications. The initially large staff required to eradicate the aegypti mosquito from infested areas can be reduced to the relatively small number needed to prevent reinfestation only after careful analysis of the situation. The numerous report forms, maps, and charts of the Service are used not only as a check on the work done, but also as a guide to when and how the program may be modified to meet changing conditions.

The permanent campaign against *Aedes aegypti* falls naturally into three quite distinct phases:

1. The initial clean-up campaign for the elimi- [illegible] early emergency yellow fever campaigns which rid localities of yellow fever but not of the vector species.
2. The discovery and elimination of the final hidden, inaccessible breeding places responsible for maintaining the species in the face of intensive anti-aegypti measures.
3. The permanent maintenance of a sentinel service to discover and eliminate any reinfestation which may occur. (Reinfestation in the early months of the sentinel service may be either "internal," due to returning

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Theoretically, anti-aegypti measures should be easy, since the breeding foci of this mosquito are generally limited to artificial water containers in, and in immediate proximity to, human habitations. In practice, the discovery and elimination of the final traces of aegypti breeding are often difficult, not only because of the instinctive wiles of the aegypti mosquito, but because of the public relations and personnel problems inherent in any attempt to apply routinely even the simplest measures in hundreds of thousands of homes scattered over all Brazil.

The reduction of aegypti breeding to a point where yellow fever disappears from the towns and cities worked is relatively easy, as the dramatic results of early campaigns testify, but the complete eradication of the species in a given place is made difficult by the instinctive ability of the female aegypti to lay her eggs in every hidden inaccessible water container, by the ability of the aegypti egg to withstand desiccation for several months, and by the constant transportation of the species from unworked to worked areas (imagoes by boat and train, and larvae and eggs in portable water containers, such as the universally used clay water jars). However, local species eradication has been accomplished in all the large cities intensively worked in Brazil during the past decade, and wide regions, including several entire states, have been cleared of aegypti.

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The permanent campaign against *Aedes aegypti* falls naturally into three quite distinct phases:

1. The initial clean-up campaign for the elimination of the easily accessible aegypti foci. This phase is similar in all respects to the early emergency yellow fever campaigns which rid localities of yellow fever but not of the vector species.
2. The discovery and elimination of the final hidden, inaccessible breeding places responsible for maintaining the species in the face of intensive anti-aegypti measures.
3. The permanent maintenance of a sentinel service to discover and eliminate any reinfestation which may occur. (Reinfestation in the early months of the sentinel service may be either "internal," due to returning

to active use of dry containers with viable eggs, or "external," due to importation of the vectors from infested areas, as already described. Later reinfestations come only from external sources.)

The initial clean-up campaign is always costly, as is also the maintenance of the service needed to guarantee the low indexes obtained. The sentinel service to discover early any reinfestation which may occur after zero indexes are secured is inexpensive, and its cost declines progressively as the danger of reinfestation disappears. The interval between adult capture surveys can be increased with safety as the cleaning of contiguous areas proceeds. Only species eradication permits of permanent aegypti control at low cost, and no effort should be spared to clear tributary areas as widely as possible.

The stage is set for the second phase of the campaign when well under 5 per cent of the houses inspected are found with aegypti foci and when only secondary, non-producing foci without pupae are found. But even secondary foci may disappear in well-worked areas before complete eradication occurs. The capture of adults is the most sensitive index of the presence or absence of *Aedes aegypti* in a neighborhood and is an essential weapon in the final clean-up. Negative reports should not be taken to mean eradication until careful search has been made for adult mosquitoes. Adult aegypti in nature are on the average short lived, and secondary foci or numerous adults in a neighborhood always indicate recent near-by pupal foci.

The final elimination of hidden inaccessible aegypti foci is achieved by:

1. Oiling or destruction of all water containers in which mosquito breeding is occurring. (Rapid pouring out or drawing off of water is almost useless; fish are expensive and are used only where no other method of control is possible.)
2. Capturing adult mosquitoes to ascertain persistence of aegypti and to locate hidden pupal producing foci.
3. Searching out pupal producing foci in neighborhoods where aegypti mosquitoes persist in the face of routine control measures.

Although Brazil has had since 1932 a rather drastic yellow fever regulation (see Decree 21,434 of May 23, 1932, p. 129), its application would be impossible in the absence of the wholehearted support of the Brazilian public. The Brazilian householder has come to recognize in the Yellow Fever Service employee who enters his home, a person who has no political or police objective, does not receive tips, applies the same measures impartially in all the homes under his jurisdiction, and is himself under careful supervision not only by his superiors but also by the householder, through a cumulative record which he leaves in each home, listing the time of each visit and the conditions found.

The local director of the service is always accessible to the public, and mosquito complaints receive prompt attention. The householder, under these circumstances, generally accepts the impositions of the Service and seldom is it necessary to have recourse to legal measures except in those cases where the recommendations of the Service involve the spending of money in structural modifications. The owner is held responsible for any mosquito breeding due to structural defects, the householder for conditions which are independent of the building itself.

As in all administrative work the principal problems of the Yellow Fever Service are those of selection, training, and supervision of personnel. The doctor entering the Service is given an intensive course of training, not only in the field work of the inspector but also in the statistical and accounting sections of the Service. At the end of his period of training the doctor is examined by officers of the Service on his knowledge covering a long list of questions which are given to him when he begins his training.

The inspector is carefully selected: he must be free from physical defects and must present a satisfactory police certificate. He is thoroughly trained and examined before being given independent responsibility. Everything is done to maintain a high esprit de corps. The inspector works in uniform, bears a numbered badge with the federal seal, and is instructed that he is an

inspector, a teacher, and a sanitary policeman, but never a "clean-up servant" as was too often the case in previous campaigns. The inspector works with confidence based on detailed written instructions and a full knowledge of the legal basis of the Service he represents; he works with interest because he knows his work will be checked, and that he individually will be given credit, or will be blamed, in accordance with the results he achieves.

The Yellow Fever Service operates on the basis of individual responsibility, fixed by written instructions which can be altered only in writing, and checked through detailed reports of work done. Work worth doing is worth recording; records are so planned as to serve the double purpose of facilitating a rapid and easy checking of the work and of giving a picture of the aegypti situation in the areas in which operations are in progress. Records are so dovetailed, one with another and with the respective summaries, that they can be analyzed rapidly by the director. Routine work is reported on printed forms, and in addition doctors, and at times other supervisors, prepare narrative diaries. Full use is made of maps and charts; all houses and even blocks are numbered as an aid to specific fixing of responsibility for work done. Adequate provision is made for checking all field work. It is not enough to outline a given program and assign it to well-trained employees; the director of a service must assume the responsibility for knowing that the work is done. No large administrative service carries on long automatically, and provision has been made in the Yellow Fever Service for the routine collection, summarizing, and presentation of the data needed by the director to follow and check the work accomplished.

GENERAL ADMINISTRATION

The central administrative office of the Yellow Fever Service is in the Federal District, Rio de Janeiro. Regional offices, subordinate to the central office and responsible for the administration of the work in the corresponding regions (see map, page 2), are maintained in Belém, Pará, for the northern region; in Recife, Pernambuco, for the northeast region; in Salvador, for the Baía region; in Belo Horizonte, for the Minas Geraes region; and in São Paulo for the southern region. Various administrative divisions, styled sectors, divisions, and posts, are formed within the region according to the number of doctors available, the presence or absence of *Aedes aegypti*, and the facility of transportation. Of these divisions, only the sector has a fully equipped statistical and accounting office.

The basic administrative unit is the zone, which consists of a group of city blocks, or a rural area, all the houses of which can be visited by one inspector at regular intervals, following an itinerary defined by the director. The unit next in importance is the district, comprising generally five or six zones so grouped as to permit, during each cycle, a careful checking of all zones by a single district inspector.

The zone inspector's work constitutes the basis of, and is the most important element in, the campaign against the aegypti mosquito. The following section, "Instructions for Inspectors of the Yellow Fever Service," is a translation of a book of instructions (Form FA74), prepared for the use of zone and district inspectors in Brazil. It contains a description of the essential points of the duties of the zone inspector and of his supervisor, the district inspector, and the principal regulations covering their work.

Form FA 74

Instructions for Inspectors of the Yellow Fever Service

Obedience.—The inspector of the Yellow Fever Service shall at all times respect his superior officers, show courtesy to the general public, and behave in a manner creditable to the Service.

All orders received from superior officers are to be executed without question. In case of doubt as to the meaning of orders, explanation may be requested; but once orders are clearly stated they are to be carried out.

Uniform.—The following uniform is worn by the inspector when on duty: khaki tunic, trousers, and cap. The tunic has four exterior pockets, two breast and two side. Side pockets measure 6½ inches wide by 8½ inches deep, inside measurements. No buttons are visible other than on pockets; these buttons are nickel for the general inspector, brass for the district inspector, and black for the zone inspector.

Each uniformed member of the field staff, from the general inspector to the servant, wears on the left arm a band of green cloth which bears a numbered badge. The arm band is held in position above the elbow by two loops, 3 inches long and ¾ of an inch wide, in such a manner as to leave a clear space of 2½ inches.

The cap is made of the same material as the uniform, attached to a wire frame with a black visor. The chin strap of the general inspector is gilded, that of the district inspector is silver, and that of the zone inspector is black. Each cap carries a badge with the same number as that on the arm band, and no two employees in the entire Service have the same number. The chin straps and badges are issued by the Service. The cap and sleeve badges are returned to the Service when an employee leaves. The loss or destruction of these, when due to carelessness, is charged against the monthly salary of the individual concerned. Black shoes, socks, and ties are regulation attire.

The laborer's cap, chin strap, tunic, and trousers are made of blue material in the same pattern as the inspector's uniform. Overalls of blue are worn by laborers working on thoroughfares. Laborers working on trench cleaning, or cutting bush, need not wear uniforms. Shoes and socks are black.

Appearance.—When reporting for duty, the inspector shall be shaven, correctly dressed, and neat in appearance.

Smoking.—An inspector may not smoke while on duty.

Alcohol.—An inspector found drinking, or under the influence of alcohol, while on duty, is instantly dismissed.

Firearms.—The carrying of firearms of any description is absolutely prohibited.

Tips.—The inspector may not accept money or any other reward for services executed or, more important, for services not executed, even during the Christmas season or other festive periods. Breach of this rule is punishable by dismissal.

Negligence.—Failure to carry out orders is inexcusable, and a plea of ignorance or forgetfulness is unavailing. Orders are written down by the inspector in the blank notebook (Form FA 12) which is issued to all members of the staff.

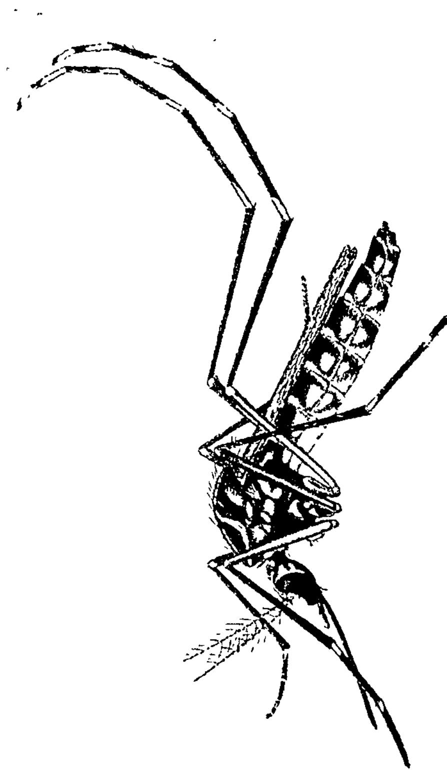
Report for duty.—Any member of the staff who, because of sickness or for other reason, is unable to report for duty, shall notify the office at least half an hour before the day's work begins.

Accidents.—If an accident occurs while an inspector is at work, the head office shall be notified as quickly as possible.

Honesty.—The inspector shall be at all times frank, honest, and truthful. He shall report carefully unusual occurrences, all foci found, all houses visited, and all failures to follow his routine. Any falsification of report forms leads to immediate dismissal.

Duties of district inspector.—The district inspector is directly responsible for the supervision of his district. His duties include:

1. Daily morning inspection of the equipment and uniforms of his inspectors, with a report on Form FA 110 of the conditions found.
2. Maintaining discipline, carrying out instructions, and reporting in writing any accidents, breach of regulations, etc.
3. Superintending and checking the work of the inspectors in the zones. Sometimes the district inspector works with the zone inspector, at other times he revises, independently, the work which has been done. Working with the inspector enables him to note the condition of the zone and to correct any faults which he may observe in the inspector's technique without interfering with the work. "Revision" by the district inspector consists of visiting the houses examined by the inspector on the same or the preceding day, to detect foci overlooked by the inspector. When the district inspector accompanies an inspector he notes on the inspector's work sheet (Form FA 2) the time of joining and of leaving him, and initials the entry.
4. Keeping the Time Sheet.
5. Reporting absentees immediately to the general inspector, who arranges for substitutes.
6. Training of new personnel and orientation of substitute inspectors in the district.
7. Settlement with courtesy and tact of all difficulties arising from contact of the inspectors with the public, such as objections to visits and to destruction of foci, and cases of assault. Any failure to settle such difficulties is reported immediately to the general inspector in writing.
8. [illegible] duties in [illegible] solve he communicates with the general inspector.
9. Care of all equipment issued in his district; preparation of weekly requisitions for material required by the district; receipt and checking



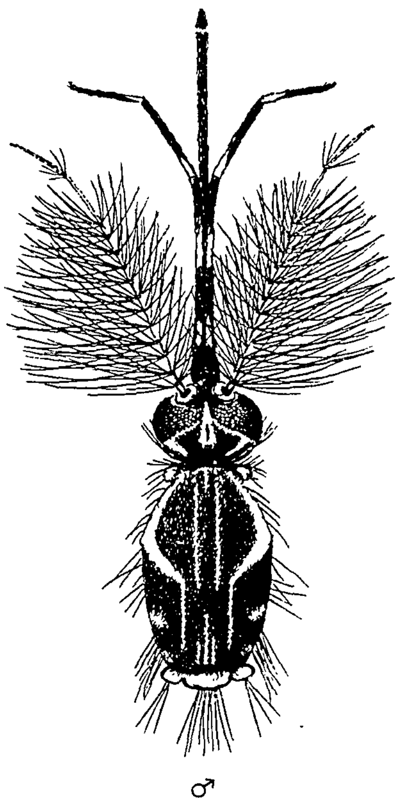


FIG. 6 Details of head of male *Aedes aegypti.*

of inspector's equipment at the end of each day's work. (A locker for storing all equipment is found in each district. The district inspector is responsible for the key to this locker)

10. Checking of flashlights in use and replacing weak batteries, noting date of issue on all batteries dispensed.
11. Checking the stores of oil and fish in his district and reporting to the general inspector any irregularities found.

Duties of zone inspector.—The fundamental duties of the zone inspector are:

To *discover* places where mosquitoes are breeding.
To *destroy* mosquito foci found.
To *prevent* the formation of other foci.

Necessary equipment.—The zone inspector must always carry with him, when on duty, the following material:

Service Identification Certificate.
The Instruction Book for Inspectors of the Yellow Fever Service (Form FA 74).
Map of his zone.
Weekly *itinerary* by blocks.
Watch in good working order.
Lumberman's *wax pencil.*
Inspector's *flag* for marking position in zone.
Flashlight complete with extra bulb. Both bulbs and battery units must be in good condition. Each battery unit must be marked with the date of issue by the district inspector dispensing it.
Large *spoon*, with copper mesh inset for collecting mosquito larvae.
Specimen *bottles* for collections of larvae.
Tin or bottle with adequate supply of the mixed *oil larvicide* used by the Service.
Lead pencil.
Printed forms, as listed below, adequate for registry of all the work of the day:

FA 2 Inspector's Work Sheet.
FA 12 Notebook containing blank pages, lined and perforated, in which miscellaneous points not covered by regular forms are noted
FA 43 Notice to leave keys of closed houses with one of the neighbors on day of regular visit.
FA 52 Autograph House Visit Record for registering in the house itself the date of each visit.
FA 53 Label for larvae.
FA 63 Note for Legal Summons.
FA 64 Mosquito Complaint.
FA 65 Fish Requisition.
FA 66 Note for Oiler.
FA 122 Aegypti Focus Report.

Working hours.—The Service schedule calls for 44 hours of work each week, but the time of beginning and closing work depends on local conditions. The zone inspector is ready to begin work in his zone at the established time and does not leave his zone before closing time without permission. Any failure to observe this rule is punished by suspension or dismissal.

The zone inspector meets with his district inspector each morning at a centrally located place in the district early enough to obtain material, pass inspection, and reach his zone promptly at the hour set to begin work. At the close of the day's work he returns to the same meeting place and turns in his material, which is kept overnight in a case expressly designed for this purpose.

Itinerary.—A zone consists of a certain number of blocks, the houses of which the zone inspector examines during the week. The zone inspector begins his weekly round every Monday morning at the time set, always at the same point in the zone. The corner of each block at which work is to begin is indicated in a special way, and all corners are marked with an arrowhead (triangle) to indicate the direction in which the block must be worked. After inspecting all the houses in a block, the inspector continues his tour block by block, following the order established in the itinerary for his zone, until all the houses of every block in the zone have been inspected. The work of each day begins where the preceding day's work ended.

Flag.—Before entering a house, the zone inspector places his Service flag on the door (window, gate, hedge, or fence). The flag is put up at right angles to the front of the building (see p. 40) so that it is plainly visible from a distance up and down the street.

Pennant.—On estates, in tenement yards, and where there are several buildings on one piece of property not arranged in blocks and with only one entrance from the public thoroughfare, the zone inspector places the Service flag at the public entrance, and a smaller triangular pennant at the entrance of the building he is inspecting.

Entering the house.—The zone inspector rings the doorbell (claps his hands, or knocks on the door), and announces, "health inspector's visit." He greets the person who opens the door with courtesy and asks permission to enter the house; this permission is obtained from a person of responsibility in the house,

and the inspector shows his identification card if requested. The inspector does not pass from one house to another by using intercommunications which may exist, nor does he pass from one back yard to another. Having finished his visit of inspection in one house, he goes out to the street and begins his visit to the next house in the way described above.

Refusal to permit inspection.—Should permission to inspect a house, in whole or in part, be refused, the zone inspector records all the facts in his notebook and makes a report of the case in writing to the district inspector. The zone inspector is absolutely forbidden to argue, dispute, or discuss the reasons for or against permitting visits: he retires from the scene without comment and reports the incident.

Calling for help.—Only in cases of threatened violence is the inspector permitted to call for help from the police, and this should be done only with the object of avoiding immediate physical injury.

Inspection.—Having received permission to inspect the house, the inspector always begins his survey in the yard; and after this is completed, he examines the bathroom, kitchen, pantry, living room, bedrooms, and other dependencies of the house. The inspector is directly responsible for the conditions in his zone which pertain to the anti-aegypti work. Consequently, he is answerable for whatever may be found in places where he may have considered routine inspection to be unnecessary.

Interior inspections.—When inspecting inside the house, the zone inspector always asks a member of the household to accompany him, particularly when entering private rooms. The same rule applies when he is inspecting hotels and rooming houses. He always knocks and asks permission to enter private rooms, bathrooms, and lavatories.

Inspections with an officer of the Service.—Whenever a zone inspector is accompanied by a doctor of the Service he announces "doctor of the Public Health Department." The inspector precedes the doctor into the house because his uniform facilitates recognition by the family. However, the doctor leaves first, since in this case he is the authority who determines whether or not the inspection has been completed. The inspector may leave the house before the doctor only if he is given orders to do so. The inspector aids the doctor in making the inspection, facilitating as far as possible the examination of all containers to be inspected.

Autograph House Visit Record (Form FA 52).—Each inspection of both the zone and the district inspector is registered on the Autograph House Visit Record (Form FA 52) at the time of the visit. On his first visit the inspector pastes the Autograph House Visit Record at some point in the house which must be inspected on each visit. This may be in the kitchen, in the bathroom, or, in the more simple type of home, on the back of the entrance door. In buildings without wooden doors or other suitable places for the form, it is pasted on a board prepared especially by the occupant of the house and fixed at a convenient place. When one Form FA 52 has been completely filled, another is pasted over it and the last visit is noted on this.

Potential mosquito breeding foci.—All containers capable of holding water are carefully and minutely examined, since they always must be considered as potential places for mosquito breeding.

Water containers.—The zone inspector examines all containers to see whether they have water in them. In his report, however, he notes only those containers which are found with water. A container recently emptied and still wet is entered as a container with water.

Empty containers.—Empty containers are placed in such a position that they cannot collect water.

Classification of water containers (Form FA 2)

Inaccessible tank: a high tank, usually made of zinc, with an outlet pipe, and placed at such a level above the floor or ground that water is distributed by gravity.

Vat: a large circular water reservoir generally constructed of wood and usually placed on brick pillars a few feet above ground, with a tap at the base for distribution of water by gravity.

Tank: a large water container placed on the level of the ground; it may be constructed of concrete, metal, brick, or wood.

Clay vessels: pots, coolers, jars, filters, etc., varying in capacity from a quart or two to many gallons.

Barrels, tubs, and drums.

Special artificial containers: receptacles of various types in which at times aegypti mosquitoes may be found breeding. These include: toilet flush tanks and basins which are not in use; tin cans; clay cups; sinks and lavatories; drains; anti-ant rings for plants; water tins used for keeping ants out of food; enamelled pots and basins; tin basins; bowls; pails and buckets; flower jars and vases; holy-water fonts; icebox pans; garage pits; water drains, especially those containing clean water; sheets of metal; egg and coconut shells; abandoned tires; old shoes; boxes; drinking vessels for chickens, birds, dogs, and other animals; pieces of iron; tins and jars buried in ground, which may collect water; crockery and shards; walls, especially those with shells, shards, or broken bottles to ward

off marauders; fallen leaves; catch basins, street drains; caldrons for heating water; animal skulls; crab, lobster, and other shells; bamboo trees; animal horns; bones; tile; sprinkling cans; disconnected plumbing pipes; grindstone troughs; water meters; flooded basements; boat bottoms, etc.

Roof gutters: zinc or copper gutters at the eaves of houses or on the roofs.

Trees and plants: rot holes, leaf crotches, etc. (Water found on fallen leaves is not included in this category, but listed under special artificial containers).

Wells and pits: pits; trenches and ditches; small ponds, natural or artificial; unlined water drains; crabholes; kitchen drains; hoofprints of animals, etc., where, in general, *Aedes aegypti* is not found.

Blank column: not to be used unless instructions are received to separate for special analysis some one type of container of local importance.

Sealing water containers.—The Service does not seal tanks or other containers which need sealing to make them mosquitoproof. The inspector requests the householder or some other responsible person to have the container sealed, and in case this is not done he fills out a Note for Legal Summons (Form FA 63).

Septic tanks; latrine pits.—When an inspector finds a latrine pit or septic tank which is not mosquitoproof, he asks the householder for oil or kerosene for immediate application, and fills out Form FA 63.

Mosquito focus; notifying family.—Every mosquito focus found is shown by the zone inspector to some responsible member of the family in whose home it is encountered.

Eliminating mosquito focus.—Every mosquito focus found is eliminated either by oiling or by destroying the container in which it is found. In case the family refuses to allow one of these measures to be taken the inspector reports the circumstances in writing to the district inspector who, in turn, becomes responsible for enforcing the necessary measure. In case the family still refuses to have the focus eliminated, as prescribed above, action is taken in accordance with Decree 21,434 of May 23, 1932.

Recurring foci.—A house in which foci are found repeatedly is reported to the district inspector in writing so that the Producing Focus Service can make an intensive search of the neighborhood for missed pupal foci

Oiling large foci.—Whenever the inspector finds a large focus, too extensive to be treated with the oil which he carries, he fills out Form FA 66 and hands it to the district inspector, who details a special oiler to the task. The inspector should not continue indefinitely to request oiling of the same permanent or potential foci but should take measures to have these eliminated. Note for Legal Summons (Form FA 63), should be filled in and the nuisance terminated.

Fish.—For containers which cannot be protected in any other way, the inspector may advise the use of larviphagous fish to destroy mosquitoes in the aquatic stage (larva, pupa).

The inspector hands to a responsible person in the house a properly filled out Fish Requisition (Form [illegible] the nearest fish

[illegible]

[illegible] inspector hears complaints of the prevalence of mosquitoes, he reports these in writing to the district inspector on Form FA 64 (Mosquito Complaint) so that the neighborhood may be worked by the capture and producing focus inspectors.

Form FA 2.—The Inspector's Work Sheet (Form FA 2) is divided into three vertical sections by two heavy black lines. There are 40 horizontal lines for reporting the inspections of individual houses, grouped in tens by four heavy black horizontal lines to facilitate counting when the form is not full.

Identification of house.—In the first vertical section of Form FA 2, to the left of the first heavy vertical line, there are columns for the identification of the house by name of the street, number of the house, and number of the block.

Definition of "house."—For the records of the Yellow Fever Service a "house" is defined as any building, or part of a building, which has an independent entrance from the street or highway (or at times from private grounds), without taking into consideration the use for which it is intended, so long as this use is not as an integral part of another "house." Examples. the garage of a residence may have an entrance from the street but is not independent; hotels and apartment houses count as one house each unless business stores with independent entrances from the street exist on the ground floor, in which case each of these counts as a "house."

When more than one family lives in a single house with independent kitchens and bathrooms, it is convenient to report on the independent "visits" made, but statistically the house is the unit.

Results of inspection of containers.—The space included between the two heavy vertical lines of Form FA 2 is used to note the number, and mosquito infestation, of the different types of water containers in each house (See sample tabulation, p. 16.)

Recording of foci.—In noting foci found, the following abbreviations are used:

- F: Focus of eggs or larvae of all species of mosquitoes except *Aedes aegypti.*
- FP: Pupal focus of all species of mosquitoes except *Aedes aegypti.*
- FA: Focus of eggs or larvae of *Aedes aegypti.*
- FAP: Pupal focus of *Aedes aegypti.*

As the inspector examines containers, he enters, in the respective columns under the proper classification, the number of each type encountered. When he finds a mosquito focus he notes it on the report, using the proper abbreviation. For example, if three inaccessible tanks be examined, and two of them have foci, one of aegypti larvae and the other of aegypti pupae, the inspector enters in the column "Inaccessible Tanks" to the left, the number "3" which indicates that three tanks were inspected; then a short dash, and above "1 FA" (focus of aegypti larvae) and below this in the same column "1 FAP" (focus of aegypti pupae), thus:

Inaccessible Tanks

3—1 FA / 1 FAP

If, now, one tank is examined and one pupal culex focus is found, the inspector marks in the column "Vats and Tanks," to the left, the number "1," which indicates that one tank was inspected, draws a short dash, and then writes "1 FP," in this manner:

Vats and Tanks

1—1 FP

If, next, the inspector examines two barrels, in one of which he finds a focus of culex eggs and larvae, he writes in the column headed "Barrels, Drums, and Tubs," to the left, the number "2," which indicates that two barrels were inspected, a short dash, and then "1 F," in this manner:

Barrels, Drums, and Tubs

2—1 F

When a mixed focus is found containing larvae of two or more species, including aegypti mosquitoes, it is entered only as an aegypti focus. In classifying foci according to stage of development, the most advanced stage is recorded. Thus a focus containing eggs, larvae, and pupae is classified as pupal; one containing eggs and larvae is classified as larval.

Registry of containers protected.—The inspector indicates in the respective columns, by means of the letters "X," "O," and "E," the measures taken for the prevention of mosquito breeding in containers. He notes the containers in which fish are found by their number and the letter "X"; thus, the entry "5—2 X" indicates that five containers were inspected, and that fish were found in two of them.

Containers oiled by the inspector are indicated by a number and the letter "O." Thus, the entry "3—2 O" indicates that three containers were examined and that two were oiled.

A container is considered eliminated ("E") only if it has been destroyed or left in such condition that mosquitoes cannot breed in it, at least for a period of several months; thus, a tank which has been sealed with tape or a tree hole which has been filled with cement may be entered in this category.

Summary of foci.—In the columns to the right of the second heavy vertical line the inspector notes the number and type of foci found, in the follow-

INSPECTOR'S WORK SHEET

Locality							Date						Zone			
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	FOCI			
Street	Number	Inspections	Block	Inaccessible Tanks	Vats and Tanks	Clay Vessels	Barrels, Drums, and Tubs	Special Artificial Containers	Roof Gutters	Trees and Plants	Wells and Pits	Other Containers	F	FP	FA	FAP
X	20	1	26	3—2 E / 1 O	3—2 FA / 2 O / 1 X	3—1 F / 1 E / 2 X	1—1 FP / 1 E	5—5 F / 5 E	3—3 FAP / 3 E	2—2 E	3—3 X	1—1 E	12	4	5	3

Sample tabulation showing how the inspector records, on Form FA 2, the results of his examination of water containers.

ing manner: In the column "F" he enters all foci [illegible] or pupae. [illegible] foci of all species of mosquitoes. In the column "FA" he enters only aegypti foci, whether the focus be composed of eggs, larvae, or pupae. In the column "FAP" he enters exclusively the aegypti foci found in the pupal state of development.

The tabulation on page 16 shows that (1) three inaccessible tanks were examined, two were found sealed (2 E), and the third, which was not sealed, was oiled by the inspector (1 O); (2) three tanks were examined, in two of which larval aegypti foci were found (2 FA) and oiled (2 O), whereas the third contained fish (1 X); (3) three clay vessels were examined, in one of which a larval focus of culex (1 F) was found, and the vessel was destroyed (1 E), whereas the others contained fish (2 X); (4) one barrel was examined, was found to contain a pupal focus of culex (1 FP), and was destroyed (1 E); (5) five special artificial containers were found to have foci of culex larvae (5 F) and were destroyed (5 E); (6) three roof gutters were found with pupal aegypti foci (3 FAP), and these gutters were removed from the house (3 E); (7) two trees were found with holes in the trunks, which were filled with cement (2 E); (8) three wells were examined and all were found with fish (3 X); (9) one "other container," a puddle, was found, which was filled in with earth (1 E). In all, 12 foci were found, of which four were pupal; five of the twelve foci had aegypti larvae or eggs and three had aegypti pupae.

Totalling Form FA 2.—When the report form FA 2 is full, or the day's work ended, the inspector enters the number of houses visited in the column marked "Number" and places the sum on the "Total" line. Closed or vacant houses are not counted, unless actually inspected. The inspector sums up the number of visits made and places the total at the bottom of the column marked "Inspections"

At the bottom of Form FA 2 are four lines marked respectively "T. cont." (total containers), "E" (eliminated), "O" (oiled), and "X" (with fish). The line "T. cont." is for the totals of containers of different types inspected; the line "E" is for the totals of containers eliminated, the line "O" is for the totals of containers oiled by the inspector, and the line "X" is for the totals of containers found with fish

Total of houses with foci.—At the bottom right-hand side of Form FA 2 are spaces for summarizing the number of houses with foci of different kinds. *Note: Houses with foci* rather than *number of foci* are recorded. Under "Houses with F" the total number of houses with foci of any kind irrespective of stage of development (eggs, larvae, or pupae) is noted; under "Houses with FP" all houses with pupal foci of any kind are entered. Under "Houses with FA" the total of houses with one or more aegypti *foci, irrespective of stage of development*, is recorded, and under "Houses with FAP" the number of houses with pupal aegypti foci. Thus:

Houses with F	/	Registers one or more foci of larvae *not aegypti*, in a single house.
Houses with FP		
Houses with FA		
Houses with FAP		

Houses with F	/	Registers a pupal focus or foci *not aegypti*, in a single house.
Houses with FP	/	
Houses with FA		
Houses with FAP		

Houses with F	/	Registers a larval focus or foci containing aegypti larvae, not pupae, in a single house.
Houses with FP		
Houses with FA	/	
Houses with FAP		

Houses with F	/	Registers a pupal focus or foci containing aegypti pupae, in a single house.
Houses with FP	/	
Houses with FA	/	
Houses with FAP	/	

Noting foci on reverse of Form FA 2.—As soon as the inspector has recorded a focus on Form FA 2 he makes the corresponding entry of it on the reverse side of the form, under the heading "(A) Containers."

(A) CONTAINERS

Containers with Water	Containers Inspected	Foci of All Species		Pupal Foci	Foci of Aegypti		Pupal Foci	Containers Eliminated	Containers Oiled	FISH		
										With Fish	Provided with Fish	Fish Distributed
Inaccessible tanks												
Vats and tanks		//			//							
Clay vessels		/										
Barrels, drums, and tubs		/		/								
Special artificial containers		/////										
Roof gutters		///		///	///		///					
Trees and plants												
Wells and pits												
Other containers												
Total:												

Section of the reverse side of Form FA 2, showing how the mosquito breeding foci recorded on the sample form on page 16 are tabulated by the type of container in which they occur.

The tabulation above illustrates how the foci recorded on the sample Form FA 2 on page 16 are entered on the reverse side of the form under the heading "(A) Containers." In a section headed "(B) Houses" on the reverse side of the form the inspector records the weekly summary of his work.

Closed vs. vacant house.—A closed house is one from which the dwellers are temporarily absent, that is, a house in which there is furniture. A vacant house is one that is untenanted and unfurnished.

Closed houses noted in Form FA 2.—A house found closed by the inspector is noted on Form FA 2 in its regular place on his itinerary, with an entry in the column devoted to containers: "closed at nine o'clock," or whatever time the attempt was made to visit the house. The inspector keeps a separate list of closed houses, using another Form FA 2, and writing at the top of it: "List of closed houses," and filling in on this list, the columns "Street," "Number," "Inspections," and "Block." When summarizing Form FA 2 the number of closed houses is not counted in the total of houses inspected.

Inspection of closed houses.—After the itinerary of the zone has been completed the inspector hands a copy of his "List of closed houses" to his district inspector. He then revisits these houses in the order of listing. He enters the results of the second visits in the column provided for this purpose, and also includes them in the weekly summary for the zone.

Closed houses not inspected.—The houses which cannot be inspected on the second visit are entered on a third Form FA 2, at the top of which is written "List of houses not visited in the week of Sept. 17–23," or whatever the week may be. The inspector keeps this form until the following week or cycle, and, on this occasion, reports the houses which remain unvisited. This form must be promptly delivered for the director's information through the district inspector. In rural districts these forms are sent in with the *District Inspector's Work Sheet* (Form FA 4).

Houses habitually closed.—On any house from which the dweller is habitually absent on the occasion of the inspector's visit, Form FA 43 (Request for Keys) is posted in a conspicuous place, or this document is handed to a neighbor with the necessary instruction. If after the posting the occupant fails to facilitate the inspector's visit by leaving the key with a neighbor, or leaving the door unlocked, the inspector forwards a note to this effect to the district inspector, who then consults with the director as to what measures should be taken.

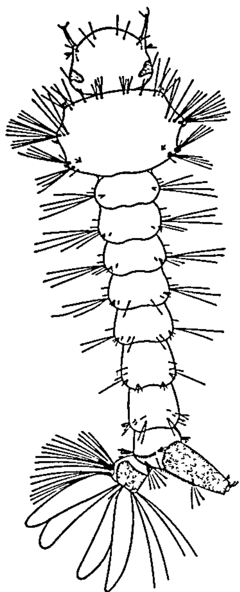
Houses partially closed.—In houses in which there are several families, it may happen that all visits cannot be made on account of the absence of some of the families. In such cases the inspector enters in the column "Inspections" on Form FA 2, the total of visits which should be made in the house; next

AEDES AEGYPTI

ANTENNAE, short and scarcely visible

HEAD, rounded, smaller than thorax

THORAX, relatively small

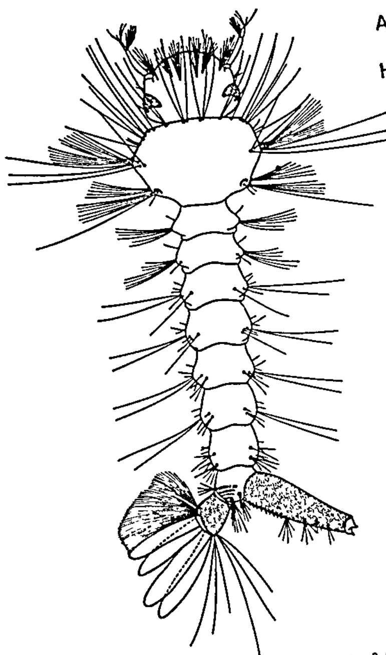


ABDOMEN, elongated and gently tapering

SYPHON, short, thick, and darker than body of the larva

FIG. 7 *Aedes aegypti* larva.

CULEX



ANTENNAE, large, more prominent than in *aegypti*

HEAD, relatively large and wide

THORAX, prominent, much wider than the abdomen

ABDOMEN, relatively short

SYPHON, longer and lighter in color than in *A. aegypti* Syphon of Culex is about the same color as the body of the larva

Fig. 8. *Culex* larva.

to this in the same column he notes in brackets the number of visits not made; thus, 3 (1) means that three visits should have been made but only two were possible as the other apartment was closed. In his "List of closed houses" the inspector enters the address of the house and writes in the column "Inspections," the number which remain unmade. When visits to these houses or apartments are made later, the result is added to the respective columns provided for containers and foci, care being taken to avoid double entries in the weekly summary.

Vacant houses: classification.—Vacant houses are divided into two categories: those which may be visited by the regular inspector of the zone and those which require a special visit.

Vacant houses inspected by zone inspector.—Vacant houses for which the keys are easily obtained, or which are accessible to the inspector without change in his itinerary, are visited by him and included in his regular report (Form FA 2).

Vacant houses inspected by vacant house inspector.—Vacant houses difficult of access, because the keys are with the owners or agents, are generally most conveniently inspected by the special vacant house inspector

Census of vacant houses (Form FA 59).—Vacant houses not visited by the zone inspector are listed on Form FA 59 (Vacant House Census). The inspector keeps up to date the copy of his census with the addresses of vacant houses not visited in his zone. When he observes that a house has been vacated he reports it to his district inspector.

Similarly, when a house in this list is reoccupied he reports its reoccupation to his district inspector and includes it in his routine inspections.

High tanks: classification.—High tanks may be divided into two categories: those which are easily accessible, and those which are inaccessible.

Accessible tanks—Tanks easily reached by the inspector without the use of a ladder are examined by him. Should he find a tank sealed and mosquito-proof, he reports it, on Form FA 2, as eliminated

Inaccessible tanks.—Special inspectors, oriented by lists on Form FA 105, inspect inaccessible tanks. Each of these inspectors carries a list of the tanks which he is to inspect and is responsible for reporting in writing to his district inspector all unlisted unsealed tanks found

Note for Legal Summons (Form FA 63).—When the inspector finds conditions which favor mosquito breeding, he informs the householder and explains what must be done by the householder to correct them. The details of the unsatisfactory conditions found, together with the measures recommended for their correction, are then carefully written out on the Note for Legal Summons (Form FA 63). This note is handed to the district inspector, who visits the house to verify the conditions and to ascertain whether or not they are being corrected. The district inspector explains in detail to the householder what work must be done, and advises him that a formal legal summons will be served if this is not attended to. He specifies the corrections to be made, explaining that it is to the best interests of all concerned that this work be completed as early as possible. Should the district inspector find that the formal legal summons to the householder is needed to get the corrections made, he signs Form FA 63 and hands it in at the office. *Should he find that legal summons is not* needed, he writes on the Form FA 63 received from the inspector "Summons not necessary," or "Already complied with." (The Note for Legal Summons does not have to be verified by the district inspector before action is taken.)

Responsibility of inspector for delivering Summons.—When the Summons (Form FA 83) based on Form FA 63, is issued the inspector delivers it to the householder on his next visit. The copy is left with the householder and the original, countersigned by the householder, is returned to the district inspector, with the notation, "Delivered and signed," entered on the back under "Results," and followed by the inspector's name and the date. The district inspector delivers the countersigned Summons to the office at the first opportunity. Should the householder refuse to countersign the Summons the inspector leaves the copy at the house, and notes under "Results" on the original, "Refused to sign; copy delivered."

Should the householder be absent, the inspector ascertains when and where he may be found and enters this information under "Results." Should the inspector find that the requirements of the Summons have been met, or that the house is closed, he makes due note, signing and dating this in the proper place. In no case should the inspector keep the Summons in his possession beyond the date marked for delivery. If for any reason the Summons cannot be delivered, the inspector notes the reason under "Results," and returns the form, signed and dated, to the office through the district inspector.

Visit to verify compliance with Summons.—When the legal period given for compliance with the Summons has expired, the original Form FA 83 from the files is reissued to the inspector, who verifies whether or not the required corrections have been made. If he finds that the recommendations have been carried

out he notes this under "Results." Should unforeseen difficulties occur, such as meeting with a refusal to permit inspection, or the finding of a closed house, this is reported under "Results," and Form FA 83 is returned to the office once more. The nature of the difficulties is reported on the back of the Summons and a new visit for verification ordered.

Mosquito Identification

Mosquitoes generally can be distinguished from other insects by a glance at the proboscis, which in mosquitoes is much longer in proportion to the body than in other insects. The proboscis is used in feeding, but only that of the female mosquito can penetrate the skin for a blood meal. The male generally lives on plant juices. The sex of mosquitoes can be determined rapidly by examining the antennae, which are hairy and plumed in the male and simple in the female.

Aedes (*Stegomyia*) *aegypti:* Color dark. Light lyre-like design on thorax; silvered spots on the sides of thorax and abdomen; white rings on legs. Biting takes place at any hour of the day or night, but there is a preference for daylight feeding.

The female scatters her eggs in small lots and may lay in several containers on the same day. The eggs are small, single, dark, and difficult to see on the walls of water containers with the naked eye.

Other species: The Brazilian book of instructions carries short notes on *Aedes scapularis*, *Aedes taeniorhynchus*, *Mansonia titillans*, and *Limatus durhami*, which are often encountered there.

Culex quinquefasciatus (*fatigans*): One of the most, if not the most, widely distributed of all mosquitoes. Body of a uniform brown color; proboscis black. Abdominal segments have basal white bands. *C. quinquefasciatus* is a very domestic mosquito. It takes advantage of a great variety of types of water containers for breeding, which makes it a year-round companion to man in the tropics. Its eggs are laid in rafts comprising an entire lot from a single female. It prefers to deposit its eggs in dirty water containing organic matter, but it will also use clean water. It begins to bite late in the afternoon and feeds by preference at night.

Genus Anopheles: Also called "Nail Mosquito" from its perpendicular resting position on the wall. Wings of most *Anopheles* species have characteristic spots. All of the *Nyssorhynchus* species have white bands on legs. The *Anopheles gambiae*, as seen with the naked eye, has uniformly colored legs. The anopheline mosquito is the vector of malaria.

CHARACTERISTICS OF AEGYPTI AND CULEX LARVAE

Aedes aegypti	*Culex*
Snake-like movement of the whole body.	Whip-like movement, more pronounced at the siphon than at the head.
Moves aimlessly, slow to reach its destination.	Quick to reach its destination.
Always moves away from a bright light.	Not affected by the light.
Very timid; at the first alarm, retreats rapidly to the bottom of the water, where it may remain some minutes.	Not so timid as *Aedes aegypti*; after being disturbed returns readily to the surface of the water.

Index to Instructions for Inspector of the Yellow Fever Service

Forms Used by Zone and District Inspectors

For ready reference, the forms used by the zone and district inspectors are presented here although they do not form part of the book of Instructions for Inspectors of the Yellow Fever Service.

The district inspector uses the same daily report form (FA 2) as does the zone inspector, noting always whether his inspections were made with the zone inspector or in revision of the latter's work.

When a complete cycle of inspections has been terminated for all the zones of his district, the district inspector prepares his report (FA 4), which summarizes for the district both his own and the zone inspectors' reports (FA 2) for all zones.

Section A of Form FA 4, "Mosquito Breeding by Containers," summarizes the work of one complete cycle of visits, whether this represents the work of one week, two weeks, or a longer period.

Section B, "Mosquito Breeding by Houses," is filled in directly from the summaries of the inspectors' reports (FA 2). The district inspector is responsible for the accuracy of these summaries.

Section C, "Inspections of District Inspectors," is taken from the daily reports (FA 2) of the district inspectors themselves.

The district inspectors usually meet with the medical director on Monday morning, to turn in all reports for the preceding week and to receive instructions for the current week.

ANTI-AEDES AEGYPTI SERVICE

INSPECTION

Date	Hour	Defects	Initials	Date	Hour	Defects	Initials

The occupant or person responsible shall be fined in accordance with Decree No 21,434 should mosquito breeding be found on these premises or this notice be defaced or destroyed

Form FA 52

Autograph House Visit Record

ANTI-AEDES AEGYPTI SERVICE

Visa

DAILY INSPECTION OF INSPECTORS AT DISTRICT HEADQUARTERS

DISTRICT INSPECTOR'S REPORT

Doctor

District

Zone	Name of Inspector	STATE OF MATERIAL															
		Illumination	Flashlight	Extra Bulb	Mirror	Watch	Uniform	Instruction Book	Form-holder	Blank Forms	Oil Can	Flag	Pennant	Pick-hammer	Identification Card	Zone Map	Glue

Symbols { + = In good condition or present; − = In bad condition or absent }

Date

District Inspector

Form FA 110

(A) CONTAINERS

Containers Found with Water	Containers Inspected	Foci of All Species	Pupal Foci	Foci of Aegypti	Pupal Foci	Cont. Eliminated	Cont. Oiled	FISH		
								With Fish	Provided with Fish	Fish Distributed
Inaccessible tanks										
Vats and tanks										
Clay vessels										
Barrels, drums, and tubs										
Special artificial containers										
Roof gutters										
Trees and plants										
Wells and pits										
Other containers										
Totals										

(B) HOUSES

Date	Inspected	Not Inspected	ALL SPECIES				AEDES AEGYPTI			
			Foci	Index	Pupal Foci	Index	Foci	Index	Pupal Foci	Index

Week										

ANTI-AEDES AEGYPTI SERVICE

DISTRICT INSPECTOR'S WORK SHEET

te . . . .

strict . . . . County. . . . .

teofopening . . . . Week of the service . . . Cycle of visits . . . Locality . . . . . Week . . . . . .

from . . . days . . . to . . . 19 . .

No of Zones	PERSONNEL	
ast census	Name	Position
Date.		
Houses		
Population		
ltitude . . . meters		
feteorological data during the eriod from . . . . to 19		
Rainfall mm		
Temperature		
Maximum mean		
Minimum mean		

(A) MOSQUITO BREEDING BY CONTAINERS

Containers Found with Water	Cont. Inspected	ALL SPECIES		A AEGYPTI		Cont. Elimi-nated*	Cont. Oiled	FISH		
		Foci	Pupal Foci	Foci	Pupal Foci			With Fish	Provided with Fish	Fish Distrib-uted
naccessible tanks										
Vats and tanks										
Clay vessels										
Barrels, drums, and tubs										
Special artificial containers										
Roof gutters										
Trees and plants										
Wells and pits										
Other containers										
Totals										

* In the space "Cont. eliminated" include the number of inaccessible tanks sealed.

rm F4 4

Week											

ANTI-AEDES AEGYPTI SERVICE

DISTRICT INSPECTOR'S WORK SHEET

Week..............

te . . . . County. .... Locality .. . .

trict .. . . Cycle of visits . .. . days

eofopening . . . Week of the service . .. from ... to . . . 19 . ..

No of Zones	PERSONNEL	
	Name	Position
ist census		
Date		
Houses		
Population		
titude .. . ... ,meters		
eteorological data during the riod from . to . . 19		
Rainfall mm . .		
Temperature . .		
Maximum mean . .		
Minimum mean .		

(A) MOSQUITO BREEDING BY CONTAINERS

Containers Found with Water	Cont. Inspected	ALL SPECIES		A. AEGYPTI		Cont. Elimi-nated*	Cont. Oiled	FISH		
		Foci	Pupal Foci	Foci	Pupal Foci			With Fish	Provided with Fish	Fish Distrib-uted
accessible tanks										
its and tanks										
ay vessels										
arrels, drums, and tubs										
ecial artificial containers										
oof gutters										
ees and plants										
ells and pits										
ther containers										
Totals										

In the space "Cont. eliminated" include the number of inaccessible tanks sealed.

*FA 4

(B) MOSQUITO BREEDING BY HOUSES

Zone	Houses Inspected	Houses Not Inspected	ALL SPECIES				AEDES AEGYPTI			
			With Foci	Index	With Pupal Foci	Pupal Index	With Foci	Index	With Pupal Foci	Index
District										

TOTALS OF HOUSES INSPECTED AND HOUSES NOT INSPECTED

Houses inspected	
Houses not inspected this cycle	
Houses not inspected two or more cycles	
Houses not assigned to any zone	
Total houses in the district or locality	
Vacant houses inspected by the zone inspector	

(C) INSPECTIONS OF DISTRICT INSPECTORS

Zone	WITH THE INSPECTOR					REINSPECTIONS				
	Houses Inspected	ALL SPECIES		A. AEGYPTI		Houses Inspected	ALL SPECIES		A. AEGYPTI	
		With Foci	Index	With Foci	Index		With Foci	Index	With Foci	Index
Total District										

OBSERVATIONS

ANTI-AEDES AEGYPTI SERVICE

NOTE FOR LEGAL SUMMONS

Zone .... Block.... . . . Street...... ... . No...........

Name of resident...

Name of landlord

Landlord's address....

Type of container. Foci .. No. of recurrences ..

Summoned for

Signature of District Inspector

Signature of Inspector

Form FA 63

FIRST VERIFICATION

Delivered to . Inspector of ..

Date .. .. To be verified on .

Result

Signature of Inspector
Responsible for Verification

SECOND VERIFICATION

Delivered to . Inspector of.....

Date . . . To be verified on ....

Result

Signature of Inspector
Responsible for Verification

Form FA 63 (Reverse)

The zone inspector enters on this form the details of unsatisfactory conditions found in any house in his area.

ROUTINE ORGANIZATION IN URBAN CENTERS

Zoning

At the beginning of anti-aegypti work in any city it has been customary to divide the area to be covered into zones of such size that the inspector starting work on Monday morning may complete all of his routine visits by Friday evening, leaving half or all of Saturday free for return visits to houses found closed on the occasion of the routine visit. Any time remaining available on Saturday may be used for special problems of the zone in accordance with orientation given by medical directors or the chief inspector.

The extent of the zone varies with the interval between visits, the size and scatter of the houses, the density of aegypti breeding, and the training of the inspector. On an average it contains about six hundred houses. The zone should not be intersected by obstacles, such as rivers and large uninhabited areas, if this can be avoided. The real unit of the city is of course the block, which in most cases has definite limits that can be used to separate one zone from another.

The proper zoning of a city is a delicate matter which requires careful initial study to distribute equitably the work to be done, and repeated revision to adjust it to changing conditions. The procedure in zoning is as follows:

1. By using a stop watch and noting the time consumed in the inspection of representative samples of different types of house, the average time factor is established for each type. Small thatched mud huts with little ground and few containers can be inspected rapidly; houses of two or more stories take more time than do one-story buildings; and houses having large grounds are the most time consuming of all.
2. A rapid but complete census is made, by blocks, of the number of each type of house to be found.
3. The blocks in the city are numbered in series on a large-scale map. At the four corners of each block the number of the block is stencilled in figures about two and one-half inches high on a wall of a building in an easily visible position. (If a new block should be formed after the survey, it receives the number of the block of which it was a part, followed by a letter.)
4. Since initial work must be carried out on a weekly cycle, the zones are formed by grouping, on the basis of the house census, as many adjacent blocks as can be worked in 40 hours, or five eight-hour days.

The time necessary for the inspection of a block is determined by multiplying the number of buildings of each type existing therein by the average number of minutes required to inspect a building of that type; the sum of these products, plus the number of minutes necessary for the inspector to walk between buildings, gives the number of minutes allowed the inspector for working that block in determining the size of his zone.

At the beginning of an antilarval service, the inspectors find many breeding foci to destroy and much educational work to do, so that the zones must be smaller than they can be later, when mosquito breeding has been reduced and the public has become accustomed to house inspections. Therefore, at the end of approximately six months of service it is wise to make a survey of the zones and institute such modifications as are indicated. Owing to growth and changes occurring in any city over a long period of time such surveys should be repeated at intervals of not less than one year.

Five or six zones are grouped into a district with a district inspector in charge. The zone number always consists of two or more figures, the first one or two indicating the district to which it belongs, the last indicating the order of the zone in the district. Example: Zone 11 indicates Zone No. 1 of the first district; Zone 46 indicates the sixth zone of the fourth district; Zone 125 indicates the fifth zone of the twelfth district.

Inspectors

The work of the zone inspector is the most important item purchased with the funds devoted to anti-aegypti work. The Yellow Fever Service must determine, by preliminary tests and examinations, that a prospective employee has the qualities required of a zone inspector and must, so long as he remains in the Service, check the work he does, for often there is a great difference between capacity and productivity. The

applicants chosen to be trained should be men of good physique between the ages of 20 and 30, possessing ordinarily good eyesight as tested by ability to read newsprint in a rather dark place, being able to write legibly and to do ordinary arithmetical calculations, and possessing no characteristics which might cause the public to object to their entering homes.

The work of the zone inspectors is supervised and checked by district inspectors, who in turn are responsible to the doctor in charge. In the larger cities the doctor in charge is usually assisted by a general inspector in the supervision of the district inspectors' work. The duties of the general inspector are the supervision and orientation of all the field personnel of the Anti-aegypti Service. (This includes all employees except doctors, office staff, and chauffeurs.)

The principal tasks of the general inspector are:

1. To keep record of, and report daily to the secretary, the presence or absence of each member of the field staff
2. To prepare and send to the director the daily itinerary[1] of the Complementary Services (see pp 45–61).
3. To provide substitutes for absentees.
4. To assign apprentices to various districts for training in the duties of inspector.
5. To supervise the Complementary and Special (pp. 64–97) Services.
6. To check the work of the district inspectors and verify whether they are taking due interest in the problems of their districts, and whether the results reported by them are trustworthy.
7. To superintend and check the inspectors' work in the zones as part of the checking of the district inspectors' work
8. To submit for approval of the director proposed modifications in the work of the zones of the Complementary and Special Services.
9. To prepare notes on individual employees for the permanent record of field personnel
10. To choose and present to the director groups of competent candidates for the field staff.

Inspection Methods

Various methods of organizing house inspections have been tried in Brazil, including the so-called dragging (arrastão) or sweeping method, in which a number of inspectors work together, visiting different houses in the same block under the eyes of the supervisor. This method requires much more walking for the inspection of a given number of houses than other methods, and since the same inspector only accidentally visits any given house in successive cycles, individual responsibility for past work cannot be fixed. Inspectors have also worked in pairs, or worked with a helper, but accumulated experience shows conclusively that the best and most economical work is done by dividing the area into zones, each of which is worked by a single inspector who is individually responsible for the conditions in his zone. Certain problems, especially in the larger cities, cannot be handled by a lone worker without special equipment, and these are met by special services directly under the sector office.

To facilitate the orientation of the zone inspector in the field and the careful checking of his work by his district chief, conventional signs, indicating the order in which the houses in the block are being visited, are painted on a wall at each street corner, together with the block number. For example: "Block No. 105" will be marked ◀ 105 ● at the corner where work in the block must begin, and simply ◀ 105 (without the dot) on the other corners of the same block. The dot following the block number indicates the building at which the inspector commences his visits, and the vertex of the triangle indicates the direction the inspector must follow in working round the block. In badly defined blocks, the signal ● ◀ is used to mark the last building belonging to the block. Where blocks are extensive, or where the position of the houses makes it difficult to find the number of the block at the corners, this number is painted on houses other than those at the corners.

Since the zone is composed of complete blocks which have signs indicating the course to be

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[1] This form varies in different cities and may be modified according to local conditions In Recife, for example, the form contains various sections in order to cover all the Complementary Services. The district inspector responsible for each service fills in the respective itinerary and hands it to the general inspector, who sends copies of all itineraries to the director In the smaller cities the total itinerary may be mapped out by the general inspector.

followed by the inspector, the written itinerary for the week's work is reduced to a simple list of blocks in the order in which they are to be inspected on the different days of the week. The inspector is given an itinerary by numbered blocks covering his zone, with indication as to each day's stint as well as a map showing the location of the blocks of his zone. The district inspector, who is responsible for checking the work of five or six zones, carries a complete itinerary of his district and a map of each one of the zones for which he is responsible.

The motorcar used by the doctor in charge is provided with a map of the city showing the location of each numbered block and the grouping of blocks into zone districts, with complete itineraries of all inspectors of the city. The car also carries a list of points in the different districts where the inspectors meet with the district inspector at the beginning and at the end of the day's work.

To impress upon the inspector the importance of carrying out every detail of the work assigned to him on every round of visits, and to facilitate the continuous checking of his work, a fixed itinerary is plotted out for each zone inspector, any deviations from which must be reported in writing. An example of a zone itinerary is given below:

ZONE ITINERARY
FIRST DISTRICT—RECIFE

Meeting Place: Rua José Rufino No. 1061
Zone 11—Building 838

Days	*Blocks*
Monday	1, 2, 3
Tuesday	3, 11, 12, 13, 14
Wednesday	15, 16, 17, 18, 19, 21, 22, 23
Thursday	23, 24, 25, 26, 27, 28, 29, 30
Friday	31, 32
Saturday	Closed houses

In the large cities similar fixed itineraries are established for the Complementary and Special Services. The following is one day's itinerary of the Maritime Service in Recife, Pernambuco:

Monday: Dock workshops, Campina (the limit being the left of the railway), covering ironwork, cranes, buildings, and galleries up to Warehouse "A." From Warehouse "A" to Gyratory Bridge, covering ironwork, cranes, warehouses, buildings, galleries, and shipping alongside. Campina, the Old Customs House Docks up to Mauricio de Nassau Bridge, covering ironwork, buildings, and boats in repair.

The point at which each inspector begins work each day is marked with a pin on a map at district headquarters, and thus an inspector can be found at any time even if his routine had been interrupted by bad weather or holidays. This map is a valuable check on the inspector and leaves no margin for excuses if he is not found in his zone.

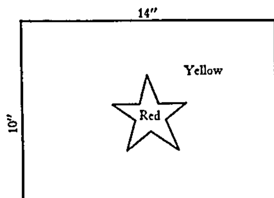
The district inspector leaves his itinerary for the day in a sealed envelope at the district headquarters. This itinerary indicates the zone and blocks which he intends to visit and also the approximate hour of each visit. Should the doctor in charge care to find the district inspector to check his work, he breaks the seal on the envelope containing the itinerary and countersigns the envelope to let the district inspector know that it was not opened by one of the inspectors.

For a proper recording of work done, beginning with the Inspector's Work Sheet, and especially for the careful checking of the work of the zone inspector by the district inspector, it is essential that every house have a number by which it may be promptly identified.

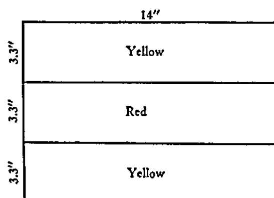
In so far as a regular official system of numbering exists, it is respected and used as the basis of assigning numbers to houses which lack them. The inspector carries a heavy lumberman's wax pencil and marks the new house numbers clearly in figures about two and one-half inches high on any easily visible part of the front of the houses, respecting as far as possible the desires of the occupants. Numbers are not written on doors or windows, since they would be invisible from the street when these were open.

The officer in charge of antilarval work must always remember that the efficiency of this service depends, in the final analysis, on the work of the zone inspector.

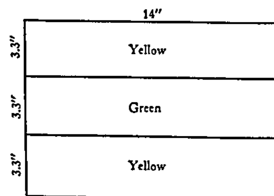
The so-called Complementary and Special Services take over certain problems which could be handled by the zone inspector only with great loss in time and energy. These services are truly complementary and do not relieve the inspector of any of his responsibility for the conditions in his zone. For example, the Adult Capture



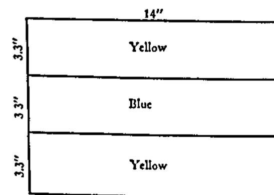
General Inspector



District Inspector

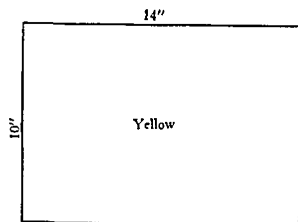


District Inspector: Captures

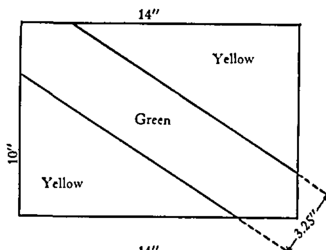


District Inspector: Producing Focus

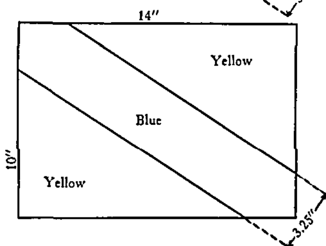
FIG. 9. Flags of the general inspector and the district inspectors of the Yellow Fever Service.



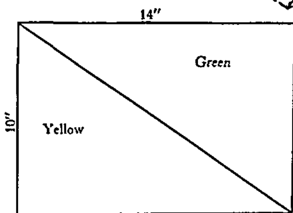
Zone Inspector



Zone Inspector: Captures



Zone Inspector: Producing Focus



Zone Inspector: Vacant House

Fig. 10. Flags of zone inspectors of the Yellow Fever Service.

and Producing Focus Services are of little value until a relatively low aegypti index has been obtained by the routine work of the inspector, but they are essential to the final reduction of this index to zero. Likewise, experience has shown that legal sanctions can be used only after the people become familiar with the object of the Service through the house inspection and educational work of the zone inspector.

Special attention has been given to the problem of making the checking of the inspectors' work as easy and as nearly automatic as possible. It has been found good business to put a district inspector over not more than five or six zone inspectors. Since the district inspector is responsible for checking the work of the zone inspectors he becomes responsible for conditions in the entire district. This personal responsibility for conditions in each zone in his district makes it impossible for him to protect negligent and inefficient inspectors; he must either report them or take the rap himself when the general inspector, the health officer in charge, or someone of the special services uncovers unsatisfactory conditions in his district.

There are two types of check visits made by the district inspector: one is for the purpose of working with the zone inspector, the other is for revision, or follow-up work. The reason for working with the zone inspector is to observe his technique and correct any faults which he may have. This is especially important in newly organized services and when inspectors are inexperienced. In dealing with experienced inspectors there is little need for this type of visit and revision gives better results. The experienced inspector knows how to work well; the check visit is made only to determine whether or not he is doing so.

Revision consists of a reinspection of the houses which have already been inspected. The revision is made, preferably, not later than 24 hours after the inspector's visit. If the check visit of the district inspector is later than 24 hours after the inspector's visit, it should not be listed as a revision but as a "surprise visit" made for the purpose of getting information regarding conditions in the zone when an inspector is not expected by the residents.

The use, in the written itinerary for each day in the week, of the block numbers marked both on the inspector's spot map and on each block corner of his zone enables the district inspector to find the inspector's flag at any time during working hours, if he is at work. After the inspector is found on a check visit, his work for the day is checked from his report (Form FA 2). By visiting a few houses already noted as inspected, and examining the water containers in them, the district inspector can decide whether the inspector's report is correct and whether he has been working properly.

The Autograph House Visit Record (Form FA 52), posted in every house inspected, enables the district inspector to check the rounds of the inspector against his itinerary. This form fails to give a picture of the work done but does oblige the inspector at least to enter the houses on his itinerary for the day and record the date, his name, and a note on the conditions found. Form FA 52 is equally useful in checking the visits reported by the district inspector, who is obliged to initial this form on all houses visited.

No matter how complete the reports and summaries of the inspectors' work may be, they are not a substitute for personal visits by the medical officer in charge. This officer therefore spends only part of his time checking records in the office and the rest of it in maintaining contact with the field service by making a certain number of revision visits himself. Only thus can he know the conditions under which his inspectors work and whether their reports are being adequately checked by the district inspectors.

Aegypti Indexes[1]

The larval, or breeding, index is used to follow the progress of control measures over a period in a given place and to compare roughly the aegypti situation in different areas. Various criteria have been used in calculating aegypti indexes, but experience has shown that the most useful of these for general purposes is the house index. In calculating this index only two factors are taken into consideration: the number of

[1] Wherever the term "aegypti index," "house index," "larval index," or simply "index" is used the percentage of houses found with foci is to be understood.

houses inspected and the number of these found to have aegypti breeding foci. The house index is the percentage of houses inspected found with aegypti foci, irrespective of the dimensions of the house, the size of the grounds on which it stands, the number of containers found with larvae, and the intensity of breeding noted. This house index is referred to hereafter as the larval index to distinguish it from the pupal index, which is the percentage of houses inspected found with pupal foci.

In using indexes it must be remembered that breeding indexes can never be translated directly into terms of adult aegypti densities, which may vary widely at the same index level according to local conditions. And yellow fever is transmitted by adult mosquiotes and not by larval foci.

The house index has been criticized by some, who insist that the house is not the unit in the production of aegypti; for even though a house may have imperfect roof gutters or other defects which make the house itself a potential focus, the majority of houses are not, in and of themselves, breeding foci. This criticism overlooks the fact that the house index is used not as a measure of mosquito production but as a measure of the distribution of aegypti breeding with relation to the distribution of human population. Admittedly, even for this purpose, the house index is very imperfect, and valid conclusions cannot be drawn without taking into consideration many other sources of information. For this reason, the Summary of Local Anti-aegypti Work (Form FA 14) carries a summary of all potential foci, i.e., containers with water as well as containers with foci, arranged by type of container, and a house index for each zone and for the town or city covered by the report. This is important, since it is possible to have a low total index for the city but a high index for some special type of container or for one or more individual zones.

The aegypti index reported by the inspector, plus that found by the medical officer and the district inspector on their control visits, gives a useful idea of conditions from week to week until the area being worked becomes relatively clean. The classification "relatively clean" can be applied to an area in which the total index is not over 5 per cent, and in which very few pupal foci can be found by the inspector and the district inspector.

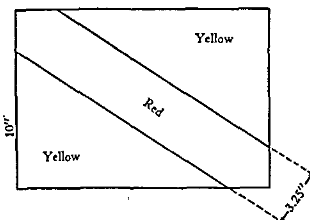
The water-container indexes, or the percentages of different potential breeding places in which breeding is taking place, are of value in the initial stages of the campaign to show the particular type of container against which special measures are needed in order to reduce the aegypti density in an especially infested area. However, once the service begins to function smoothly the house index is found to be much more useful as a measure of aegypti distribution in the community.

The female aegypti mosquito does not generally lay all her eggs at the same time, or in the same water container; but on the other hand her range of flight is limited. These factors both tend to increase the value of the house index and to lessen the relative value of the water-container index.

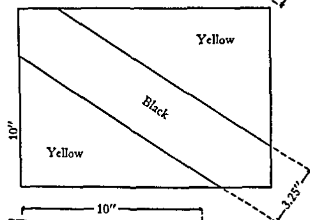
The following routine is used for the registry of indexes: "0" (zero) is used only when no breeding whatever is found; any index between 0 and 0.05, even when based on only one aegypti focus, irrespective of the number of houses inspected, is represented by 0.0. The indexes from 0.05 to 0.14 are represented by 0.1. For noting indexes on the various statistical forms (FA 14, FA 14A, FA 69, FA 140, and FA 141, see pp. 109 to 119) the approximation of the first decimal figure is used. When the second decimal figure is below 5 the first one is retained; but when the second decimal is 5 or more, the first decimal figure is increased by one digit. Example: 0.33 is registered as 0.3; 4.56 as 4.6; 0.95 as 1.0; 0.45 as 0.5; 4.73 as 4.7; 4.96 as 5.0.

Indexes represent only the percentage of houses, among those inspected, in which aegypti breeding *was found and reported* by the inspector. The index can never give an idea of the size, number, and productivity of the foci which were found, or of the scatter of the houses in which breeding was occurring; it can tell nothing regarding the distribution of breeding missed by the inspector, or found by him but not reported.

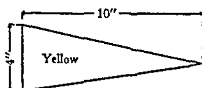
The efficiency and imagination of the inspector are important factors in determining the number of foci he discovers. The length of time he has worked in the zone, and his honesty, are



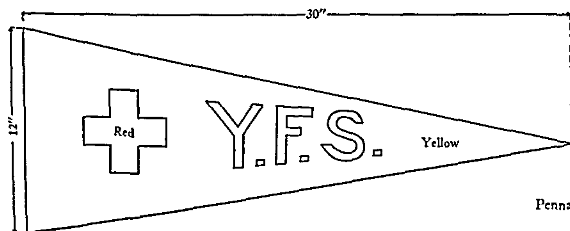
Zone Inspector: Roof Gutter Service



Zone Inspector: Cemetery Service



Zone Inspector's Pennant



Pennants for Boats

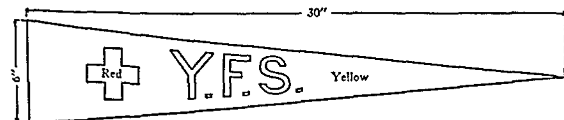


FIG. 11. Zone inspector's pennant, and flags and pennants of Special Services.

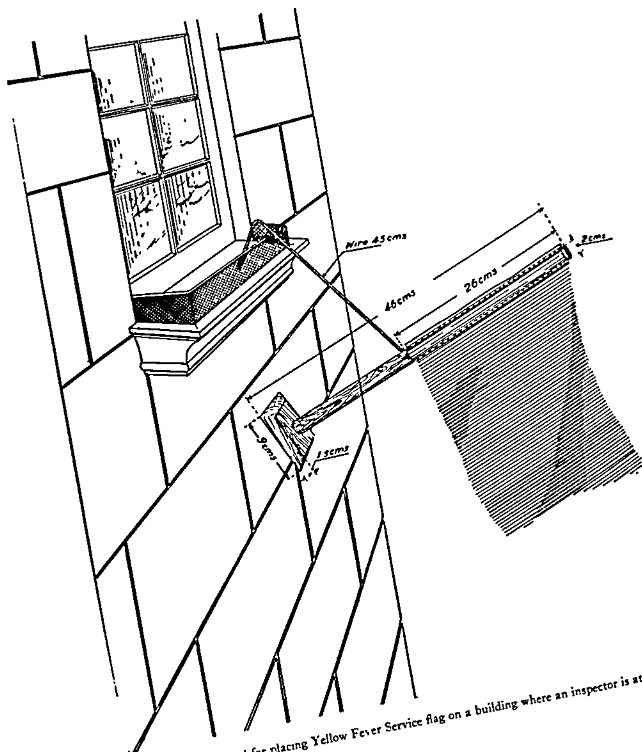


Fig. 13. Support used for placing Yellow Fever Service flag on a building where an inspector is at work

index." The recognition in recent years of the permanent threat of reinfection of cities, inherent in the existence of jungle yellow fever, obliges the responsible authorities to organize anti-aegypti measures on a permanent basis. Factors which have made possible the eradication of the aegypti mosquito from numerous Brazilian cities, counties, and even states, are:

1. The special Producing Focus Service for the discovery and destruction of hidden pupal and producing foci. This Service is effective in the final stage of aegypti eradication in places where the index has already been greatly reduced by the efficient work of the zone inspector (see pp. 81-89 for full details on this Service).
2. The special Adult Capture Service, which checks on the presence of the aegypti mosquito by searching for and identifying adults caught in houses (see pp. 89-97).
3. The routine application of a mixture of oils to all water containers found breeding mosquitoes.

Oiling

[illegible]

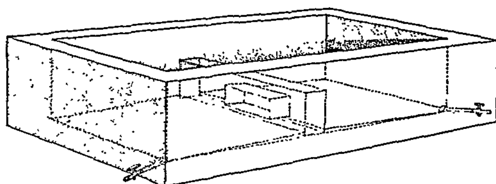
ing anti-aegypti work in an area all mosquito foci found by the inspectors are subjected to routine oiling, with the exceptions mentioned *below:*

1. Routine oiling is generally begun only after two or three inspections have been made and the householder has been advised, either by the inspector or by means of a handbill left at the house, that routine oiling of all containers with foci will be undertaken on and after a given date. During this initial period, before the routine oiling is begun, foci are destroyed by emptying the water from the offending container (This often fails to get rid of small larvae and of course leaves the eggs on the walls, so that the breeding is only interrupted and not prevented.) When yellow fever exists in or threatens to invade a locality, routine oiling of all containers found with foci starts immediately *during the first inspection without previous notice.*
2. Certain large containers, such as cisterns, which are to be protected immediately by fish, are not oiled, since oiling would make them unsuitable for fish.
3. Certain large ground foci of mosquitoes, other than aegypti, are not oiled when not of sufficient importance to justify the cost.
4. Oiling may be omitted when the householder prefers to destroy the offending container in the presence of the inspector. (Strangely enough some people develop such a deep-seated antipathy to oiling that they prefer to destroy the container even though it may have some value.)
5. Abandoned containers without value are destroyed rather than oiled.

Routine oiling has been the most forceful measure in persuading the householder to protect water containers from mosquitoes. Its punitive action is direct and immediate and falls on the person responsible for the care of the containers found with mosquito breeding. The oil used in Brazil, a mixture of fuel and Diesel oils, is disagreeable enough in taste and appearance so that all containers oiled are thoroughly washed out before renewed use, scrubbing of the containers removes any eggs which may have escaped the direct action of the oil. Thus it has become axiomatic in Brazil that the only aegypti *breeding which resists routine oiling is that* which occurs in hidden, undiscovered, and hence unoiled foci. However, oiling should be considered as an emergency or temporary measure to be used only until such time as the container is permanently protected.

Each zone inspector carries a flask or a can with from approximately 300 cc. to one liter of oil, according to local conditions. The Yellow Fever Service mixture is excellent for preventing aegypti breeding and is cheap, but it is not satisfactory for use in spray pumps for outside oiling. In Rio de Janeiro the inspector has a special liter can with a spout and with a device for holding a small flask of paste for putting up notices (see Fig. 14, p. 42).

The inspector uses a stick with which to stir the oiled water to insure thorough spreading of the oil not only over the entire water surface but also well up on the walls of the container. Such stirring is better than the use of excessive amounts of oil. It is difficult, at times impossible, to get oil to form a film on the surface of water which contains soap or certain fatty substances even in very small quantitites. This difficulty is encountered with highly volatile oils such as



VIEW IN PERSPECTIVE

LATERAL VIEW

0,30

0,70

2,50

1,30

DIAGRAM

Fig. 15. Tank used at fish depots of the Yellow Fever Service for receiving fish as they are purchased, and for maintaining a reserve supply.

tageous when they exist simultaneously over an entire region.)

8. Correlation of adult captures with the zone inspectors' aegypti indexes.

It must be borne in mind that a lengthened cycle of inspections is feasible only when guaranteed by routine oiling or destruction of each and every water container found with larvae and that a lengthened cycle is dangerous so long as aegypti mosquitoes are present.

The local director must not alter the cycle without previous authorization of the regional director. The regional director shall submit for the approval of the general director details of plans for any general change in the length of cycles in his region.

COMPLEMENTARY SERVICES IN URBAN AREAS

The zone inspector's work, as has previously been stated, is the core of the anti-aegypti measures. There are, however, certain problems which cannot be handled advantageously by the zone inspector, and Complementary Services have been established to take care of these problems. The inspectors of the Complementary Services are carefully selected, are given special training, and carry special equipment for their tasks. Among the Complementary Services which may be useful at times in the large urban centers are:

1. Fish Service
2. Inaccessible Tank Service
3. Cemetery Service
4. Ditches and Wasteland Service
5. Oiling Service
6. Vacant House Service

Fish Service

Larviphagous fish were widely used for the control of aegypti breeding before the enforcement of routine oiling, with Diesel and fuel oil mixtures, of all water containers found with evidence of mosquito breeding. But the widespread use of fish in small household containers proved very costly and troublesome because of the high replacement rate, and it has been abandoned in favor of oiling, which is more economical and gives more immediate and more permanent results. Today, fish are used only for the easily accessible large water containers in which they can become self-sustaining, and where for special reasons other methods of control cannot be used. Most small species of fish, and the young of some large species, are more or less larviphagous; the selection of the species used depends on availability, adaptability to artificial containers, hardihood, cost, facility of transportation, etc.

The species most commonly used by the Yellow Fever Service in Brazil are those popularly known as "piabas"[1] and "barrigudinhos," especially adapted to muddy or turbid water. In some places "acaras" and "piaós," larger and more sluggish fish, are used.

Fish are generally contracted for locally, the price in Brazil ranging from $.50 to $1.50 per thousand. In some places the price varies with the species furnished. All payments are made on the basis of the number of fish alive and well 24 hours after delivery to the fish tank of the Yellow Fever Service. A receipt for fish received (Form FA 107) is issued to the supplier 24 hours after he has delivered them, with the number which have died in the meantime deducted from the total to be paid for. The accounting section reports the number of fish purchased each month in each locality. Where fish are easily secured, and the aegypti index is low, the householder gets fish from independent sources if he cares to use them in order to avoid the oiling of his water containers.

The life span of fish in domestic water containers depends to a great extent on the care given them. In practice it has been found best to have the householder, in whose container the fish are to live, go or send to the fish depot for the fish. Fish which have been fetched always get better care than do those gratuitously distributed by the Service. The Service may make direct distribution of fish to the home in the initial stages of emergency campaigns in localities where rapid reduction of the aegypti index is essential because of the presence, or threat, of yellow fever. In this case they are not issued against the Fish Requisition (Form FA 65), but

[1] Popular names of fish vary from place to place and several species may be grouped under a single name.

one and one-half miles. Barrels are inexpensive, easily transported, and suitable as deposits for fish in places where the turnover is small; several barrels can be used where business is heavier. The central depot generally has a special tank for receiving fish as purchased and for maintaining a reserve supply (see Fig. 15). This tank can be cleaned easily without removing the fish.

ANTI-AEDES AEGYPTI SERVICE

FISH REQUISITION

Zone . .. Block

Street . . . .

No. of fish needed . . .

Species of fish . .

Type of container . .

Number of containers .

Date . . . . .

Inspector .. . . ..

The nearest fish tank is at

Street . . .. . . No. .

DELIVERY

No. of fish delivered . . . . .

Species . . . .

Date. . . . .

Delivered by . . . .

Form FA 65

The caretaker of the fish depot delivers fish on presentation of this requisition.

Inaccessible Tank Service

*In cities where the water supply is not constant throughout the day, it is customary for houses to have one or more tanks which receive water when it is available, and act as pressure reservoirs when it is not. Regulations provide that these tanks shall be so placed as to be easily accessible to the zone inspector (Article 12 of Decree No. 21,434 of May 23, 1932), but many of those in old houses cannot be made accessible without undue expense.

Water tanks are classified as:

1. Accessible to the zone inspector, when their examination presents no special problems. Such tanks are inspected by the zone inspector and reported routinely on Form FA 2, and also under "Containers" on Form FA 14. In case a tank is properly sealed, the inspector need not verify whether it contains water or not but notes it on Form FA 2 as "inspected" and "eliminated" as a possible focus.
2. Inaccessible to the zone inspector, when, because of their height, a ladder is required for their inspection. The inaccessible tanks are recapitulated weekly under "B" on Form FA 15.

The number of inaccessible water tanks existing in his zone is periodically checked and reported by the zone inspector on Form FA 105. Whenever the zone inspector during his routine visits finds an unregistered inaccessible water tank, he notes it on his copy of Form FA 105 and also in his notebook, for reporting to the district inspector. Similar notations are made whenever a water tank is destroyed or removed. On the basis of the information contained on Form FA 105 special inspectors of the Inaccessible Tank Service are sent out.

The Inaccessible Tank Service is responsible for knowing the number, location, and condition of the water tanks which cannot be easily inspected by the zone inspector and for making them mosquitoproof. Inaccessible tanks are always sealed, as stocking with fish is unsatisfactory because of the difficulty of inspection to determine whether the fish are still alive. Only where sealing is completely impossible are fish used and then only after a screened overflow pipe has been installed to prevent their being carried over the . d the outlet pipe has

ANTI-AEDES AEGYPTI SERVICE

FISH TANK—WEEKLY REPORT

Post .... Municipality ....

Fish tank at........ Street, No. ....

Week from ... to .... 19.. ......

Days	FISH DELIVERED				Fish Received	Remarks
	Service	Public	Dead	Total		
Mon.						
Tue.						
Wed.						
Thu.						
Fri						
Sat.						
Total						

Balance at end of last week

Fish received this week

Total

Fish delivered this week

Balance for next week

Tank Keeper

Form FA 40

been screened and extended above the bottom of the tank so that the water is never all drained off. However, the Yellow Fever Service itself makes no effort to seal tanks; experience has shown that tanks sealed free of charge are opened on the slightest pretext, whereas those sealed by, and at the expense of, the householder remain untouched for months or even years.

The method of sealing varies with the type of tank. Sealing to be satisfactory must:

1. Offer an absolute guarantee against the entrance of mosquitoes over a relatively long period of time.
2. Be easily examined by the inspector on his routine visit.
3. Be easy to replace or repair

Wooden covers are not acceptable, owing to their tendency to warp and crack.

The inspector of the Inaccessible Tank Service works with an assistant, who carries a ladder. He carefully examines the cover and the sealing of the tank, leaving a note of his visit and of conditions found, on the Autograph House Visit Record (Form FA 52), which must be pasted in a prominent place on the tank itself. Similar notes are made on Form FA 105. The following

abbreviations have been adopted to indicate the condition of inaccessible tanks:

- MP: Completely sealed and mosquitoproof.
- C: Covered but not mosquitoproof.
- F: With fish.
- DIS: Disconnected. The word "disconnected" indicates that the tank is completely empty and that water cannot enter it.
- UP: Unprotected. This indicates that the tank is open, contains or may receive water, and has no protection whatsoever against mosquitoes.

Foci found are noted in the column "Inspections" on Form FA 105 and also on Form FA 2. If the tank is not in satisfactory condition a Note for Legal Summons (Form FA 63) is made out. Although subsequent inspection, following the delivery of the Note for Legal Summons may be made by the inaccessible tank inspector, the results of these inspections are not recorded on Form FA 105, which is reserved exclusively for the survey or census inspection.

For the guidance of those responsible for sealing tanks, the Service furnishes drawings (figs. 16 and 17), showing the best methods of closing different types of tanks. The inspector, when filling out the Note for Legal Summons, indicates whether the tank is of "A" or "B" type, as shown on the drawings, and attaches the corresponding drawing to the form handed to the householder.

When conditions in general are satisfactory, almost all of the tanks mosquitoproof, and the aegypti index of the area zero, the inspection cycle is increased to a quarterly, a semiannual, or an annual period. Inspection is often suspended indefinitely in places where the Adult Capture Service is checking the amount of adult aegypti production.

Cemetery Service

In many cities cemeteries constitute a special problem in antilarval work. The numerous graves and tombs, adorned with vases, urns, and jars of flowers, require careful inspection and adequate control measures.

The Yellow Fever Service distributes printed forms advising the public to use wet sand instead of water in all cemetery vases and jars. In some cemeteries photographs are displayed at the entrance showing how the vases should be filled with sand. Sand piles are placed at convenient points in the cemetery.

Large cemeteries are worked by a special inspector equipped as are the inspectors of the Producing Focus Service and assisted by the necessary number of helpers (servants, oilers, etc.). He makes a thorough inspection for the discovery and destruction of mosquito foci and fills all vases with earth or sand. Annually, immediately after All Souls' Day, he makes a special visit to replace the water in the vases with wet sand.

In smaller cities, the cemeteries can be dealt with efficiently by the zone inspector during his routine visit.

Ditches and Wasteland Service

Cleaning ditches, cutting weeds on vacant lots, clearing brush on wasteland, removing rubbish, etc., is the responsibility of the property owners and to a certain extent of the municipality. Owners are warned to maintain their properties free of mosquito breeding, and the municipality is reminded of its obligation to prevent breeding on public lands and highways.

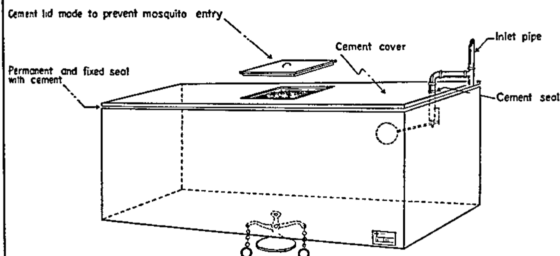
However, in certain emergencies the Yellow Fever Service organizes a temporary gang of men for the cleaning of ditches and wasteland. The organization, previous authorization for which is obtained from the sector director, and the administration of such work are carried out in accordance with local conditions in each case.

Oiling Service

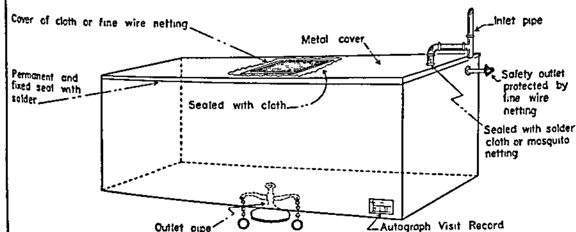
In some places the Yellow Fever Service maintains oilers who use a spray pump of the "Panama" type. These oilers, in accordance with an itinerary, carry out the routine oiling of certain large breeding places, and also attend to the oiling indicated on Form FA 66 handed in by the inspector. When the oiler works on his itinerary he uses the Inspector's Work Sheet (Form FA 2) to record the work done. Where there are ditches, lakes, wells, pits, etc., requiring constant and costly oiling, measures are taken as soon as possible to ensure their definite elimination. Legal action is taken, when necessary, to oblige the

TYPE "A"

WATER TANKS MADE OF REINFORCED CONCRETE MASONRY OR IRON



WATER TANK CONSTRUCTED OF REINFORCED CONCRETE OR MASONRY



GALVANIZED (USUALLY) IRON WATER TANK

NOTE: Wooden covers are not acceptable

Fig. 16. Methods of mosquitoproofing concrete and iron water tanks.

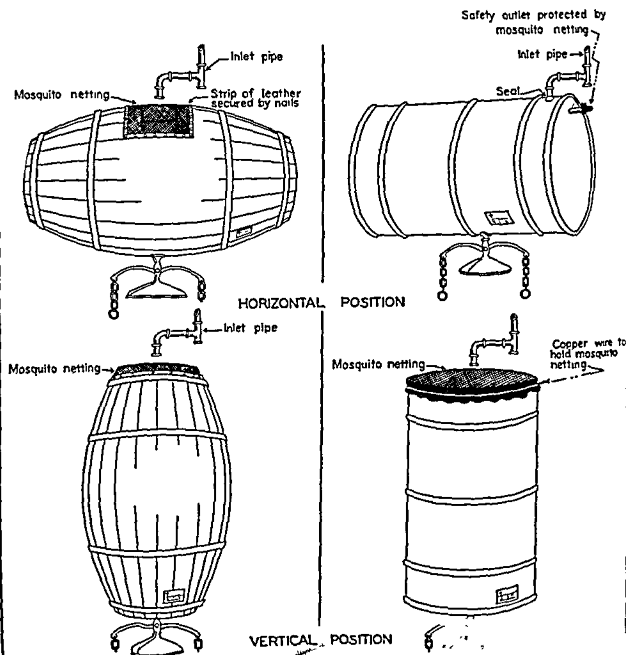


Fig. 17. Water tanks of the barrel and dru[illegible] protected [illegible] entry.

ANTI-AEDES AEGYPTI SERVICE

OIL DEPOT—WEEKLY REPORT

Post . . . . Municipality . . . .

Oil depot located at . . . . Street, No. . . . . .

Week from . . . . . . to . . . .

Date	Quantity	Issued to (Signature)	Category

In stock . . . . .

Oil received . ____________

Total . . . . . .

Oil issued during week . . ____________

Balance . . . .

____
District Inspector

Form FA 41

owners to correct unsatisfactory conditions, instead of continuing with the oiling indefinitely.

Those superintending and checking the work should foresee the possibility of an unscrupulous oiler discharging the greater part of the contents of the pump into the first few containers to be oiled to lessen the weight of the pump, which results in insufficient oiling of the remainder.

In order to facilitate oiling, a number of oil depots are maintained at different points in the control area where the inspectors and oilers can obtain fresh supplies as needed. For the purpose of checking the use of oil a record of receipt and disbursement is kept at each depot in the cities worked. This Oil Depot Report (Form FA 42) is made up weekly, the total of oil issued being checked with Form FA 66 in order to verify whether the quantity consumed is reasonable.

Oil sent to depots in the interior (where the consumption is relatively small) is dispatched in used five-gallon gasoline tins and not in drums. These cans, full of oil of the type used by the Yellow Fever Service, may be closed by soldering without danger. Care is taken to ensure that the oil depots in the interior are never without oil, and also that they are never greatly overstocked, which might lead to waste.

The oil depots send a report on the last day of the month to the sector or local office showing the stock of oil on hand at the end of the preceding month, the amount received during the month, the amount issued, and the amount in stock at the end of the current month.

The quantity of oil issued by the depot must be frequently checked against the number and type of containers oiled, as reported on Form FA 14 submitted by the corresponding post.

Vacant House Service

The vacant house is differentiated from the closed house. The vacant house is unfurnished and unoccupied; the closed house is furnished and occupied, with its occupants temporarily absent.[1] The closed house is generally inspected by the regular zone inspector, whereas the cant house is at times handled by a special spector. The vacant house which has not b made mosquitoproof is a dangerous sourc aegypti production where the antimosquito ca paign has not yet reduced the aegypti index t very low figure.

The poorer types of vacant houses can ge erally be visited by the zone inspector, since t keys are usually with the neighbors. Where piped water supply does not exist or is not co nected the house often requires only a yard i spection. Vacant houses with a piped wat supply and connected with a sewerage syste are especially dangerous and must be very car fully inspected.

The work of the Vacant House Service is base on a quarterly census of vacant houses made b the inspector in each zone and recorded on For FA 59. In taking the census of vacant hous the inspector includes only those he cannot wo easily on his regular routine visit. A copy Form FA 59 is made for the vacant house inspec tor, and the zone inspector keeps his copy up t date by noting vacant houses which may be re occupied and occupied houses which becom vacant. The inspector reports such changes dail through the district inspector so that the offic list and the vacant house inspector's list can b duly altered.

In small cities the Vacant House Service is simple, but in large cities it becomes cumbersome and inefficient if it is not handled by carefully trained personnel. In large cities a special district inspector for the Vacant House Service supervises, orients, and inspects the squads of inspectors and procurers of keys. The district inspector and the key-men generally ride bicycles.

Getting the keys is the most difficult part of the work. The inspector, at the time he lists a house as "vacant," makes every effort to note on Form FA 59 the name and address of the person holding the key. The key-man receives a list of the houses for which keys are lacking and then organizes his itinerary (Form FA 105), listing the addresses of the holders of keys in the order in which they can be most easily visited. He leaves copies of this itinerary for the director

[1] In certain localities the summer vacation season finds many houses closed, with their occupants in the mountains or at the beach. Where the anti-aegypti work is well established this problem can be handled by the zone inspector, but in areas where the work is new he may require special assistance.

ANTI-AEDES AEGYPTI SERVICE

NOTICE

To the occupants of house No. .. .. Street . . . .

In order to facilitate the work of the Yellow Fever Service, the occupants of this house are requested to leave the keys with some neighbor whenever they are to be absent, so that the inspector's visit may be made at the regular time and they may avoid the penalty established by law.

A house which is vacant and cannot be inspected because the keys are not available, or because of delay or refusal to deliver the keys, or because of any other difficulties created by the holder of the keys, shall be sealed until after its inspection by the Yellow Fever Service. In such cases measures shall be taken to enter and inspect the building in the presence of a police officer, following which it shall be closed and again sealed. (Article 5 of Decree No. 21,434.)

Form FA 43

Request for keys, posted by the inspector in a prominent place on a house regularly found closed.

and for the general inspector, to facilitate the checking of his activities.

The key-man gives a receipt for each key (Form FA 39) and puts an identification tag on the key (Form FA 38). The keys collected one day are distributed on the morning of the following day to the special vacant house squads, who inspect the corresponding houses and return the keys to the office on the same day so they can be given back to their owners on the next day. Only in special circumstances do keys remain in the possession of the Service more than 48 hours. In cases of urgency, inspections are made and keys returned within a few hours.

When a key is returned, the recipient signs for it on the reverse side of Form FA 38. This shows that the key has been returned promptly and serves as a protection against later claims that a missing key has never been returned. Receipts for returned keys are kept on file for three months or more.

Owners may refuse to give the keys and prefer to go to the house to open it at the hour marked for the inspection. However, rarely is the house open at the time agreed upon; and the Service always insists on getting the key, except when there are objects of great value in the house.

The purpose of the inspection of the vacant house is not only to find and destroy existing

ANTI-AEDES AEGYPTI SERVICE

KEY RECEIPT

Received. .. .. keys of house at
No.... .. ... Street. .. ..
at .. .. A.M. P.M. . . . . month .. day . . .19 . .
Inspector ... .

Form FA 39

Receipt given to the person supplying the key of a vacant house.

ANTI-AEDES AEGYPTI SERVICE

KEY TAG

Zone
Street Block
Key found at No.
Name of owner:

Form FA 38

Key obtained: Date
Returned. Date
Signature of recipient of returned key:

Form FA 38 (reverse)

Front and back of the identification tag for the key of a vacant house.

foci but also to prepare the house so that it will be free of mosquito breeding during a period of at least 30 days.

The vacant house inspector works with a helper. Each squad carries the following equipment in addition to that carried by the inspector.

- Ladder
- Shovel
- Trowel
- Three-liter tin of oil
- Pail of paste or glue
- Strips of old newspapers
- Machete and iron hooks for lifting manholes
- Rope
- Cement
- Cheap cotton cloth
- Forms FA 45, FA 62, and FA 81

Work begins with the yard. Before entering the house, the water is cut off. All worthless water containers are collected, counted, and buried; movable containers of value are placed in such a position that water cannot collect in them. Immovable containers are filled with earth or sand. The bathroom is visited next. The toilet is flushed, and the toilet basin is oiled before being sealed. The chain of the flush tank is rolled up and placed on the top of the tank. The water tank is drained off, oiled, and sealed. A request not to break the seals on the toilet basin and tank until the house is occupied (Form FA 81) is pasted on the door of the bathroom and on the seat of the toilet basin. One to four ounces of oil are poured down each drain pipe.

Any pools of rain water found in the house are covered with sand or earth, and the responsible window or doorsill is plugged with paper; leaks in the roof are repaired if possible. When there are house defects of potential importance to mosquito breeding which cannot be easily corrected by the inspector, he makes a note for the legal summons of the owner. If stocking the tanks or cisterns with fish is indicated, a requisition for fish is prepared and given, with the house key, to the fish distributor. If the house is near a fish depot the inspector's helper fetches the fish immediately. The use of fish in vacant houses must be limited to containers which can

ANTI-AEDES AEGYPTI SERVICE

KEY-MAN'S WORK SHEET

. .. . Date . ... Hour starting .. ..

Address, Street, Number	Zone	Block	Hour of Arrival	Hour of Departure	Reasons for Delay

ture of District Inspector . . ..

ature of Doctor . ...

Signature of Inspector

FA 105

ANTI-AEDES AEGYPTI SERVICE

REPORT OF VACANT HOUSE INSPECTION

Zone .... Block. .... .. Street .. .. No......... . Floor.... ....

Keys left at. ... .

Name of proprietor . .. .

Address of proprietor . . . .

Date of inspections ... .

REINSPECTION

Date of last inspection . . . .

State of sealing done during last visit .. . .

... .

Water cut off . . . . Water tanks emptied...........................

State of roof gutters . . . . Water tanks sealed ....

Containers buried . ... Sanitary apparatus sealed...... ....

Containers put under shelter . . Windows sealed .. ..

Fixed containers filled with sand . . . Fish requested ....

Legal summons to . . . .

Containers Found with Water	Cont. Inspected	ALL SPECIES		AEGYPTI		Cont. Eliminated	Cont. Oiled	CONTAINERS		
		F	FP	FA	FAP			With Fish	Provided with Fish	Fish Distributed
Inaccessible tanks										
Vats and tanks										
Clay vessels										
Barrel, drums, tubs										
Spec. art. cont.										
Roof gutters										
Trees and plants										
Wells and pits										
Other containers										
Totals										

In the space "Cont. Eliminated" show the number of sealed water tanks

Time of leaving last house . . . .

Time of arrival this house . . . .

Time of leaving this house . . ..

Zone Inspector

Form FA 62

The data from the column "Containers" on this form are included on Form FA 14. The number of vacant houses inspected in all zones during the week, and their respective indexes, are included at the end of the list of indexes of the zone on Form FA 14. Form FA 62 greatly facilitates the checking of the work of the squad.

ANTI-AEDES AEGYPTI SERVICE

INSPECTION NOTE FOR VACANT HOUSE

Zone .... Street . . . . No. ... . Block .

Keys left at.. . . . .

Name of proprietor . .. .

Address of proprietor. . . . .

Inspections	Date	Hour Ended	Inspector's Signature	Initials of Controller
First				
Second				
Third				
Fourth				
Fifth				
Sixth				

Form FA 45

Form posted on a vacant house for the recording of inspections

ANTI-AEDES AEGYPTI SERVICE

THIS SEALING HAS BEEN DONE BY THE ANTI-AEDES AEGYPTI SERVICE TO PREVENT MOSQUITO BREEDING WHILE THE HOUSE IS VACANT

PLEASE DO NOT BREAK THE SEALS

UNTIL THE HOUSE IS OCCUPIED

BREAKING THIS SEAL IS PUNISHABLE BY FINE (ARTICLES 3 and 10 OF DECREE NO. 21,434 of MAY 23, 1932)

Form FA 81

Seal for toilet basin, flush tank, and bathroom door of a vacant house.

ANTI-AEDES AEGYPTI SERVICE

REPORT OF VACANT HOUSE INSPECTION

Zone .. . .. Block .. .. Street . . .. No......... . Floor ....

Keys left at... . . . .

Name of proprietor . . . .

Address of proprietor . . . .

Date of inspections .. . .

REINSPECTION

Date of last inspection . . . .

State of sealing done during last visit . . . .

. . . .

Water cut off. . . Water tanks emptied.................. ....

State of roof gutters . .. Water tanks sealed ....

Containers buried . . . . Sanitary apparatus sealed............ ....

Containers put under shelter .. . Windows sealed.. . ...

Fixed containers filled with sand Fish requested ... .

Legal summons to . . . .

Containers Found with Water	Cont. Inspected	ALL SPECIES		AEGYPTI		Cont. Eliminated	Cont. Oiled	CONTAINERS		
		F	FP	FA	FAP			With Fish	Provided with Fish	Fish Distributed
Inaccessible tanks										
Vats and tanks										
Clay vessels										
Barrel, drums, tubs										
Spec. art. cont										
Roof gutters										
Trees and plants										
Wells and pits										
Other containers										
Totals										

In the space "Cont. Eliminated" show the number of sealed water tanks

Time of leaving last house . . . .

Time of arrival this house . . ..

Time of leaving this house . . . .

Zone Inspector

Form FA 62

The data from the column "Containers" on this form are included on Form *FA 14* *The number of* vacant houses inspected in all zones during the week, and their respective indexes, are included at the end of the list of indexes of the zone on Form FA 14. Form FA 62 greatly facilitates the checking of the work of the squad.

ANTI-AEDES AEGYPTI SERVICE

INSPECTION NOTE FOR VACANT HOUSE

Zone.... .. Street . .. . . . No. .... Block

Keys left at . . . .

Name of proprietor .. . .

Address of proprietor . ...

Inspections	Date	Hour Ended	Inspector's Signature	Initials of Controller
First				
Second				
Third				
Fourth				
Fifth				
Sixth				

Form FA 45

Form posted on a vacant house for the recording of inspections.

ANTI-AEDES AEGYPTI SERVICE

THIS SEALING HAS BEEN DONE BY THE ANTI-AEDES AEGYPTI SERVICE TO PREVENT MOSQUITO BREEDING WHILE THE HOUSE IS VACANT

PLEASE DO NOT BREAK THE SEALS

UNTIL THE HOUSE IS OCCUPIED.

BREAKING THIS SEAL IS PUNISHABLE BY FINE (ARTICLES 3 and 10 OF DECREE NO 21,434 of MAY 23, 1932)

Form FA 81

Seal for toilet basin, flush tank, and bathroom door of a vacant house.

ANTI-AEDES AEGYPTI SERVICE

MARITIME SERVICE

The Yellow Fever Service herewith advises the Director of the Maritime Police that the ....

.... named ....

in charge of .... .does not fulfill the legal requirements

of the Yellow Fever Service, and that the required certificate has been

cancelled.

refused.

Place .... Date ....

Signature of Inspector

Form FA 119

Notice of the cancellation of a Certificate of Protection against Mosquito Breeding.

zone, quite apart from the ships themselves, because of the large number of machines, cranes, casks, pipes, small boats, boilers, etc., and the old iron, which lie about. Rain water in the depressions of these objects is excellent for aegypti breeding. The responsible companies are notified to store everything in such a way that water cannot collect. When the inspector finds potential water containers he places them in such a position that they cannot hold water. When they cannot be inverted the cavities are filled with sand, or when this is not possible they are oiled.

Owners are held responsible for any mosquito breeding found on their ships. Bilge and ballast water in lighters and coastwise shipping are routinely treated with creolin by the owners at their own expense. Under no circumstances does the service supply creolin (a crude preparation of creosol and resin soap used as deodorant and disinfectant) or a similar product for use as a larvicide.

One of the most important water containers found on small ships is the barrel for drinking water. Regulations require that this barrel ha a faucet and a permanent close-fitting dou screen cover on a metal frame which fits snu into the opening through which water is pou into the barrel. Plugs are used to facilitate clea ing and the removal of sediment from the b tom of the barrel (Fig. 18).

The Yellow Fever Service depends on t maritime police and the other port authorit for aid in enforcing its regulations. The ma time police authorize a shipmaster to move ship or leave port only after the presentation a recently issued certificate of the Yellow Fe Service (Form FA 118) which states that t boat is in a satisfactory condition from t standpoint of possible mosquito breeding. Wit out this document the master is liable to a fi should he attempt to leave port.

The Certificate of Protection against Mo quito Breeding is issued to a ship if its barr are mosquitoproofed in accordance with regul tions and if no other unprotected and dangero containers are found on board. Certificates a

...pe of drinking-water barrel, with faucet, for use on shipboard

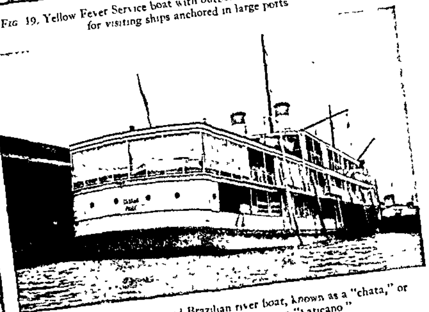


Fig 19. Yellow Fever Service boat with outboard motor, used by inspectors for visiting ships anchored in large ports

Fig 20 Large flat-bottomed Brazilian river boat, known as a "chata," or commonly, in the Amazon region, as a "vaticano"

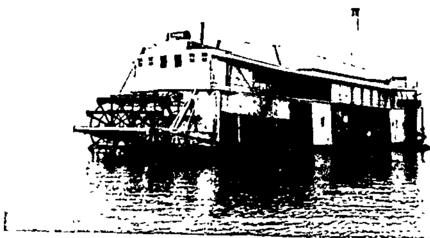


Fig 21 Stern-wheel boat of the type that sails the upper reaches of Brazilian rivers.



Fig 22. A floating shop, which is towed from place to place along a river.



Fig 23. Sailboats, rowboats, and canoes at a Brazilian river port

valid for not more than three months, and each ship has to be reinspected at least quarterly in order to keep its sailing papers in order. The stubs of the valid certificates remain with the marine inspector, who notes on them the results of subsequent inspections. A certificate is cancelled at any inspection when unprotected water containers are found on board and is reissued only after all defects found have been corrected.

The inspector, in accordance with his itinerary, furnishes certificates to boats in satisfactory condition, noting any pertinent observations on the back of the certificate. Certificates for ships which are ready to sail are issued by the inspector of the Yellow Fever Service at a given hour every day at the headquarters of the maritime police. When a ship is found in an unsatisfactory condition a notice of the cancellation of its certificate is sent to the maritime police on Form FA 119, stating that the sailing permit has been refused or cancelled.

The maritime inspector uses the zone inspector's work sheet (Form FA 2), and the data from it are summarized in the regular way on Form FA 14. The Autograph House Visit Record (Form FA 52) is glued to a board and hung in a place protected from rain and sea water, so that there is always on the boat a record of the date on which the ship was inspected and the conditions found. The following abbreviations have been adopted for use on form FA 52 for the Maritime and River Services to indicate the condition of water barrels and other water receptacles:

MP: Completely mosquitoproof, with metal screen and faucet.
S: Screened, but not in satisfactory condition.
UP: Completely unprotected.
F. With fish.

River Service

The inspection of river craft in Brazil is of primary interest because of the facility with which aegypti mosquitoes breed on river boats and are disseminated along their routes.

River craft carry both foci and adults from place to place, and experience has shown that river ports cannot be thoroughly cleaned unless the craft which call at these ports are made aegypti proof.

River boats can be divided into three classes:

1. Large ships, with iron hulls, wide flat bottoms, and a series of holds which cannot be inspected when there is cargo aboard. These are known as "chatas" (flatbottoms), and commonly in the Amazon region as "vaticanos," since they hold everything in their interior (Fig 20) Sternwheel boats sailing the upper reaches of the rivers are also included in this group (Fig 21).
2. Ships of medium size, generally with narrow hulls, also of iron, with one or two series of cargo holds in the center. This is the most common type in the Amazon region and is locally called "gaiola" (cage), because of its exterior aspect and also because it carries both men and animals cooped up on board for many days. Included in this group are also the closed gaiolas that leave the Amazon region and sail along the coast to the frontier of the Guianas; and other small ships, launches, cargo boats, cargo launches, and lighters, including intermediary types such as the "floating shop" (Fig. 22).
3. Small boats, generally with wooden hulls and open holds, but with the bottom divided by the keelson and ribs, where water generally accumulates. This group comprises sailboats, rowboats, and the simplest types of canoes (Fig 23).

The shipping which comes under the eye of the River Service may be classified into two groups:

1. Shipping which is easily inspected because no cargo is carried and all water containers are readily accessible
2 Shipping in which the bilge water and that in the bottom of the holds is inaccessible to the inspector when the ship is loaded; these must be provided with the "automatic oiling device" (see p. 70 and fig 25).

Some of the water containers found on the river ships, such as water tanks, clay vessels, barrels, and special artificial containers, are problems of the maritime and land services as well; but others are peculiar to freshwater ships and, because of the constancy with which they become aegypti foci, merit some consideration here.

Holds, or spaces between the keelson and the floor timbers of the ship, often have enough water to cover completely the keelson and the floor timbers. Should the level of the bilge water drop after mosquito breeding has begun in it, there remain many collections of water separated one from the other by the ribs, each with its mosquito larvae, giving the impression of many foci. However, statistically the bilge water is considered as part of the hold to which it belongs. Each hold is designated in accordance with its location, as the hawser hold, the forward hold, the midship hold, and the stern hold. In the smaller ships there are often no holds; in such case the interior of the hull, when used for cargo, must have automatic oiling pipes to prevent mosquito breeding in the bilge water.

At the extreme end of the stern of many boats there are internal divisions of the hull which follow its slope and which serve as lockers to hold rope bumpers. In these compartments water may accumulate from the decks by seepage. Many of the smaller ships do not have such compartments.

Tanks of two principal types are found on ships: fresh water tanks for needs on the trip, and ballast tanks. There are generally four ballast tanks, two forward and two aft.

Scuppers are frequently obstructed by refuse and may become the site of aegypti breeding.

In general the mosquitoproofing methods employed by the River Service, such as screening barrels and other receptacles used for water supplies, are those of the Maritime Service, but the work on river boats requires extreme care to prevent all mosquito breeding. Each ship is examined completely. All compartments, even those said to be without water, are carefully inspected. Special attention is given to cabin floors, cavities on winches, life boats, and to all those innumerable places in which water collects.

Bilge water generally comes from below, but it may also come from rain and from water used in washing the decks; so even watertight compartments are examined. The inspector affixes the Autograph House Visit Record (Form FA 52) at all places difficult of access, thus marking his passage. Only after the holds have been visited and the oiling device inspected is the certificate permitting the ship to take on cargo issued.

The inspector, as in the Maritime Service, has a boat at his disposal to permit examination of anchored ships (Fig. 19). Since ship inspection is dirty work the inspectors use dark-colored overalls when on board. On all other occasions full uniform is worn. The flag of the River Service is the same as that of the Maritime Service and is so placed as to be visible from the point of embarkation.

The inspection of the accessible water containers of river craft and of seagoing vessels is identical. However, since all water on board river craft is fresh water and hence a potential source of aegypti breeding, maximum care is necessary in examining the water in the holds and at the bottom of the hull of cargo boats.

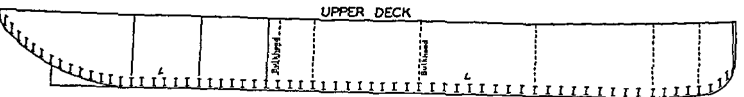
Special Requirements for River Craft

Holds.—Once a ship is loaded, the holds and hull are inaccessible and routine inspections at ports of call lose much of their value. River craft can be guaranteed against mosquito breeding only through the installation of an automatic oiling system for the treatment of bilge water. This automatic oiling system was developed only after many other suggestions had been tried without result. Though the system is here called automatic it really requires a great deal of energetic supervision to guarantee its efficiency.

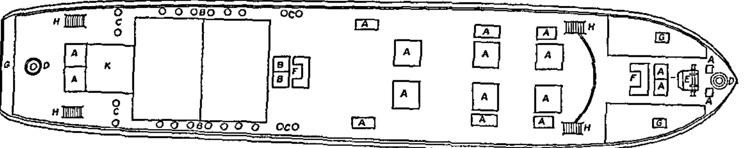
The automatic oiling system is designed to distribute larvicide from the upper deck to all parts of the bottom of the hull. It consists (Fig. 25) of a pipe ¾ of an inch in diameter which crosses, horizontally, all of the ribs of the ship and is perforated in such a manner that openings 1/32 of an inch in diameter occur at the midpoint between each two ribs. Each end of this horizontal pipe connects with a 1-inch pipe which accompanies the bulkhead or the hull to the upper deck. The opening of this perpendicular pipe is fitted into the deck with a special metal screw cover which is flush with the deck floor.

The owners of river craft are obliged to install this special oiling device and to maintain a stock of creolin. The captain is responsible for having at least two liters of a 1:20 solution of creolin in water poured into each deck opening at least once a week. The captain keeps a record of the

UPPER DECK



LONGITUDINAL SECTION



A — Hatchways B — Coaling hatch C — Openings of Domestic and ballast tanks
D — Capstan E — Winch F — Mast butts G — Lockers H — Stairs I — Boilers J — Machines
K — Kitchen L — Ribs M — Scuppers N — Cargo holds O — Breadroom P — Messroom
Q — Refrigerator R — Water tanks S — Coal bunkers T — Hawser U — Ballast

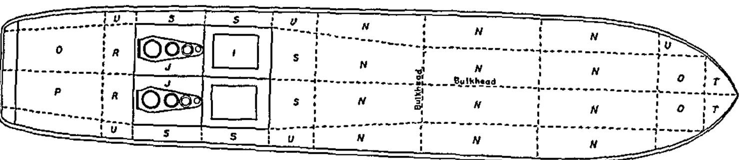
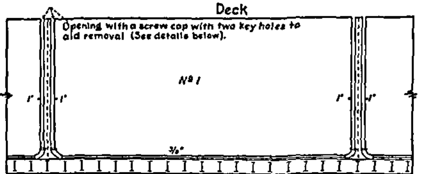
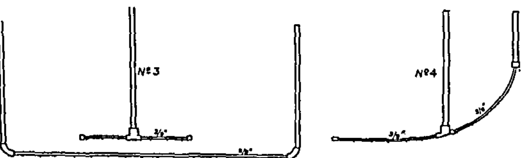


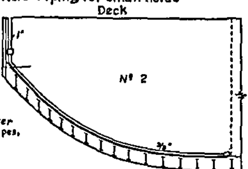
Fig 24 Plan of the holds of a river boat.

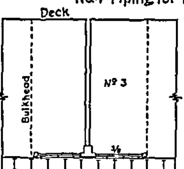




No. 1 Piping for large holds
No. 3 Piping for small holds

No. 2 Piping for holds in the stern
No. 4 Piping for holds in the bow





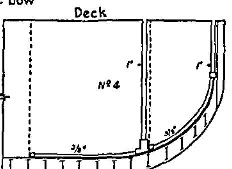






Fig. 25. Diagram of automatic oiling device for introducing larvicide into the holds of a river boat.

MARITIME AND RIVER SERVICE

State .... Log Book of ....
(name of boat)

Type of craft .... Name of owner ....

Port of origin .... Port of destination ....

PORTS CALLED AT DURING TRIP			OILINGS DURING TRIP		Supply of Creolin or Oil on Board	Date Proper Functioning of Automatic Oiling Device Verified
Name	Arrival	Departure	Locality	Date		

Note: This report must be given to the Yellow Fever Service inspector together with the Certificate of Protection against Mosquito Breeding

____
Captain

Form LF 5

creolin stock and of the date and amount of larvicide used, on the Travel Log for Boats (Form LF 5), which also carries dates of testing the operation of the device. In the course of time the perforations in the horizontal pipes may become clogged or rust may work into the pipes. At the ports where the ship stops for cleaning and repairs and at those where the holds are unloaded, careful check is made on the operation of the oiling device by pouring a solution of creolin into the openings of the vertical tubes on the upper deck and observing whether there is an outflow from all the horizontal tubes which discharge into the bilge water of the hull. Only after this test does the inspector give a certificate of satisfactory operation or a notice to correct defects.

Stern lockers.—If communications are established by means of small openings between divisions of the stern lockers and between them and the stern hold, no accumulation of water from the deck should be found in the lockers. In some ships it is possible to extend the pipes of the oiling device of the stern hold to the lockers, permitting them to be treated with larvicide.

Tanks.—All openings of water tanks, whether these are used for domestic water supplies or for ballast, should be protected in such a way that mosquitoes cannot gain entrance. Tanks can generally be protected by a double screen cover on a metal frame which fits closely into the opening. This screen is removed only while the tanks are being cleaned.

Scuppers.—Scuppers should be maintained free of obstruction, and scupper holes should be large enough to permit the passage of all waste material carried by the water. Scuppers, especially where they pass cabins, should be sufficiently deep to prevent overflow of water onto the floors of the cabins, as this often causes the formation of aegypti foci. Cabin floors, and those of the crew's quarters particularly, should slope to the scuppers in such a manner as to prevent the accumulation of water.

Life boats.—Life boats merit careful attention; they should be kept covered with sailcloth in good condition, but even so they must be carefully inspected on each visit. The bottoms of life boats should be treated with kerosene or, better, with creolin solution.

Forms Used by River Service

Forms FA 2R and 4R.—Because of the heavy incidence of aegypti foci in water containers peculiar to river craft, the forms used for reporting land and maritime work are inadequate for the River Service. A River Service Inspector's Work Sheet (Form FA 2R) has therefore been adapted from the regular Inspector's Work Sheet (Form FA 2) with several headings altered to fit the needs of the work on river craft. The District Inspector's Work Sheet—River Service (Form FA 4R) has necessarily been adapted in the same manner to receive the summary of data from Form FA 2R.

Form FA 15R.—The work of both the River Service and the Maritime Service is tabulated on Form FA 15R (Work Summary—River Service). This work is included in the regular summary report for the cycle, and is listed apart from the results for the regular zones. The water containers peculiar to boats are included under "Special artificial containers," since only a general summary of this work is required. Any analysis of the work of the River Service is based on a study of Forms FA 4R and FA 15R, which always accompany Form FA 14 for places where Special Services exist.

Form FA 52.—The Autograph House Visit Record (Form FA 52) is used in the same way in the River Service as in the Maritime Service, but more copies of the form are required on each craft; in general, each hold of a river boat and all other places difficult of access have Autograph House Visit Records which are signed by the inspector at the time of each visit.

Form FA 118.—The Certificate of Protection against Mosquito Breeding (Form FA 118) is used as in the Maritime Service, except that it has space reserved on the reverse side for notes as to whether the boat has or has not a receipt for its Travel Log.

Form FA 122.—On this form is recorded the location of mosquito breeding found on a boat. It is useful in deciding whether those in charge of the boat have taken to heart previous instructions on how to prevent mosquito breeding.

Form LF 5.—The Travel Log for Boats (Form LF 5) is a record and check on the func-

(A) CONTAINERS

Containers with Water	Containers Inspected	Foci of All Species	Pupal Foci	Foci of Aegypti	Pupal Foci	Cont. Eliminated	Cont. Oiled	FISH: With Fish	FISH: Provided with Fish	FISH: Fish Distributed
Inaccessible tanks										
Vats and tanks										
Clay vessels										
Barrels, drums, and tubs										
Special artificial containers										
Scuppers										
Life boats										
Cranes										
Cabin floors										
Holds										
Totals										

(B) BOATS

Date	Inspected	Not Inspected	ALL SPECIES: Foci	ALL SPECIES: Index	ALL SPECIES: Pupal Foci	ALL SPECIES: Index	AEDES AEGYPTI: Foci	AEDES AEGYPTI: Index	AEDES AEGYPTI: Pupal Foci	AEDES AEGYPTI: Index

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Week

ANTI-AEDES AEGYPTI SERVICE

DISTRICT INSPECTOR'S WORK SHEET—RIVER SERVICE

. . . . County.... . . .. Locality ....

.... Cycle of visits .. . . days

... . . . Week of the service . . ... . from . . . . to ... . . .19 . ...

No of zones	PERSONNEL	
	Name	Position
s on board		
. . . . meters		
l data during the to . . . .19 . .		
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re		
um mean . . .		
um mean .. .		

(A) MOSQUITO BREEDING BY CONTAINERS

s Found Water	Cont. Inspected	ALL SPECIES		AEGYPTI		Cont Eliminated*	Cont. Oiled	FISH		
		Foci	Pupal Foci	Foci	Pupal Foci			With Fish	Provided with Fish	Fish Distributed
tanks										
ks										
ns, and tubs										
cial containers										

pace "Cont. Eliminated" include the number of high tanks sealed.

tioning of the automatic oiling system. The captain of the boat is responsible for entries on this form covering the date and place of application of larvicide, the amount of larvicide on board, the condition of the automatic oiling device, and the dates of arrival at, and departure from, all ports touched by the boat. These last items are often of value in ascertaining the probable origin of the infestations found.

Enforcing Regulations

Although Decree No. 21,434 of May 23, 1932, gives ample authority for the work of the River Service, it has been found convenient to get from state authorities additional regulations in areas where river craft is extensive, in order to avoid all possible discussions with the operating ship lines. These state regulations, based on the federal decree, codify the requirements of the Service as applied to river boats. The state decree provides for no state penalties but calls attention to the penalties which are incurred under the federal decree.

Article 1.—Each boat which arrives in port, or is stationed therein, shall be inspected once weekly. (Article 1, Decree No. 21,434, May 23, 1932).

Par. 1.—This inspection may be omitted at the discretion of the local director of the Yellow Fever Service in the case of large steamers and battleships in transit.

Article 2.—All parts of a boat shall be inspected, from the bow to the stern, and from the top to the bottom.

Article 3.—The inspection shall be conducted and considered complete only if all sections of the boat are readily accessible. The holds must be empty in order to fulfill this requirement (Article 2, Decree No. 21,434).

Article 4.—All holds of a boat shall be inspected:

a. On arrival at its destination.
b. On arrival in its home port.
c. When remaining more than one week in any port.
d. If stationary in its home port.

Article 5.—The holds may be exempted from inspection in the case of:

a. Ships with cargo, in transit (in port less than one week).
b. Ships coming from foreign ports other than those of South America.

Article 6.—Each boat, in order to legalize its presence in, or departure from, port shall have a "Certificate of Protection against Mosquito Breeding" issued by the Yellow Fever Service.

Par. 1.—The Certificate shall be valid for a period of one month for small craft, such as fishing boats, pleasure boats, launches, etc. For steamers and other large vessels it shall be valid for one voyage, at the discretion of the state director of the Yellow Fever Service.

Par. 2.—The Certificate shall be cancelled immediately upon discovery of conditions incompatible with these regulations.

Article 7.—The Certificate shall not be issued to boats, enumerated under Article 4, without full inspection of holds and bilge water.

Par. 1.—The Certificate can be obtained after the holds have been emptied at least partially to permit full inspection.

Par. 2.—In case of refusal, penalties shall be applied as stipulated in Article 4 and Paragraphs 1, 2, and 3 of Decree No. 21,434.

Article 8.—In all boats inspected, oil or other larvicide shall be applied to all surfaces of holds and other potential water containers whether they contain water at the time of inspection or not.

Par. 1.—The larvicide shall be furnished by the ship owner.

Par. 2.—In case of his refusal to furnish larvicide the inspection shall not be made and the Certificate shall not be issued; if already issued, it shall be cancelled.

Article 9.—The person responsible for a boat on which foci are found shall be subject to a fine of from $ 25 to $2.50, doubled in case of recurrences (Article 7, Decree No. 21,434).

Article 10.—A ship which incurs penalties under the provisions of Article 9 can obtain a Certificate only on presentation of the receipt from the National Treasury covering the payment of the fine.

Article 11.—Any boat which fails to comply with these regulations shall not receive a new Certificate and shall have its old one cancelled; in such cases legal summons shall be served to the responsible person, giving a reasonable period of time for the execution of the necessary measures (Article 9, Decree No. 21,434).

Article 12.—The captain, or agent, of a ship which leaves port without the Certificate shall be fined $5.00 to $50.00, doubled at each recurrence (Article 3, Decree No. 21,434).

Par. 1.—Legal proceedings shall be instituted

(B) INACCESSIBLE TANKS

Cycle . . ..days Cycle began... . . .. Total No of inspections during cycle ....

Condition	Previous Census	Inspected
Mosquitoproof		
With fish		
Disconnected		
Covered		
Open		
Total....... ..		

Inaccessible tanks found with foci during period covered by this report.

All species	Aegypti
Total..	Total..... ....
Pupal	Pupal....... ......

(C) DITCHES AND WASTELAND SERVICE

Ditches dug (in meters)..............................

Ditches cleaned (in meters)... ....

Land cleaned (sq. m)........... ...,... ....

Tin cans, etc., destroyed........... ... ...

Other work........ . ...

(D) EMERGENCY SERVICES

: by fine of
'nce. (Article

shall be kept
collection of

'ver Service
'd (Form FA
per measures
n or tamper-
00 to $10 00
, Decree No.

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were read-
l in number
nber of foci
lmost com-
, 2 per cent,
visits made
rease of al-
, generally
reeding dis-
failed to re-
a zone on a
to produce

(E) PERSONNEL

(1) Producing Focus Service and Special Revision Work

Personnel	Employees of Y.F.S.	Paid by *Others*	Total
District inspector			
Insp. Special Service			
Extra inspectors			
Day laborers			
Total..................			

(2) Inaccessible Tanks

Personnel	Employees of Y.F.S	Paid by Others	Total
District inspector			
Insp. Complementary Service			
Extra inspectors			
Day laborers			
Total			

Form FA 15R (Reverse)

(3) Ditches and Wasteland Service

Personnel	Employees of Y.F.S	Paid by *Others*	Total
District inspector			
Insp. Complementary Service			
Extra inspectors			
Day laborers			
Total.................			

(4) Emergency Service

Personnel	Employees of Y.F.S.	Paid by Others	Total
District inspector			
Insp. Complementary Service			
Extra inspectors			
Day laborers			
Total..................			

immediately on return of the responsible person to the port in which the infraction occurred.

Article 13.—All potential mosquito breeding places boats shall be protected in accordance with the gulations of the Yellow Fever Service. The person ponsible for failure to protect all potential water ntainers shall be punished by a fine of $2.50 to 5.00, doubled at each recurrence (Article 29, De- e No. 21,434).

Article 14.—By "potential breeding places" are derstood all places on board ship in which water ay accumulate under conditions permitting the rmation of larval foci

Article 15.—All holds and storerooms shall be ted with an automatic oiling system for the ap- cation of larvicide in the manner prescribed by e Yellow Fever Service.

Article 16.—The person responsible for the ship all have oil or larvicide applied through the auto- atic system once a week whether the boat is lying [illegible]

port the holds give no evidence of recent application of oil or larvicide, or if the oiling system is not in good working order, the person responsible for the boat shall be fined in accordance with Article 4 of Decree No. 21,434.

Par 2.—Even if evidence of recent application of larvicide be found but dead mosquito larvae are present, their presence shall be considered as an indication that larvicide has not been applied regularly, and a fine of from $ 25 to $2 50 shall be imposed, doubled at each recurrence (Article 7, Decree No. 21,434).

Article 17.—In the ports of origin and of destina- on, as well as in all ports in which the Yellow Fever ervice functions, the Travel Log shall be submitted operly filled in, together with the Certificate of otection against Mosquito Breeding. A failure to bmit these documents shall be punishable by fine, accordance with Article 4, Decree No. 21,434, of 5 00 to $50 00, doubled at each recurrence.

Article 18.—A Travel Log and a Certificate of rotection against Mosquito Breeding shall be rnished by the Yellow Fever Service to all boats quipped with the automatic oiling device. The per- on receiving the Log shall sign a receipt for it on e back of the stub.

Article 19.—The use of tires as buffers shall be ermitted only if they have perforations at least one ch in diameter at intervals of not more than eight ches, to prevent accumulations of water. Infractions of this regulation are punishable by fine of $1.00 to $10.00, doubled at each recurrence. (Article 59, Decree No. 21,434).

Article 20.—All scuppers and drains shall be kept clean and free of obstruction to prevent collection of stagnant water, or overflowing.

Article 21.—Where the Yellow Fever Service affixes the Autograph House Visit Record (Form FA 52), the responsible person shall take proper measures to protect this record against destruction or tampering, under penalty of a fine of from $1.00 to $10.00 for non-observance. (Articles 48 and 59, Decree No. 21,434).

Producing Focus Service

Experience had shown that the aegypti breeding index reported for a zone depended not only on the amount of breeding in the zone but also on the intelligence and diligence of the inspector. This was especially true for relatively clean areas where antilarval work had been well organized and was in the hands of competent personnel. In the initial stages of a campaign, there was often little difference between the indexes reported by the zone inspector on one hand, and the district and general inspectors and the medical director on the other. As the breeding index came down, however, the most obvious foci were destroyed, with the result that as time went on it became more and more difficult to find existing foci. Eventually even conscientious inspectors reported only about 50 per cent as many foci as could be found by their superiors in the same area, and this situation tended to become permanent at a point short of the disappearance of the aegypti mosquitoes.

An analysis of the different phases of the campaign showed that pupal foci, which were readily found in the beginning, decreased in number more rapidly than did the total number of foci found, and generally disappeared almost completely when the aegypti index fell to 2 per cent, or less. Strangely enough, the check visits made at this point, while showing an increase of almost 100 per cent in foci found, generally showed no great increase in pupal breeding discovered; also repeated reinspections failed to reduce the house index to zero. When a zone on a weekly inspection cycle continues to produce

only larval foci over a period of weeks or months, it is logical to assume that hidden breeding places which remain undisturbed from week to week are responsible for the production of the adults which continue to seed the larval foci found and destroyed each week by the inspector.

A *Producing Focus Service* was first organized in 1928 to search out such hidden foci, based on the location of secondary larval foci reported by the zone inspector. This work was only partially successful before the introduction of the Adult Capture Service because, as zones were cleaned up, fewer and fewer unprotected containers remained which could give clews through the formation of secondary foci, and even these few came to be cleaned out each week by the householder just before the routine weekly visit of the inspector. Unsuccessful attempts were made from time to time to use "sentinel" or "trap" water containers to localize hidden producing foci. Under these conditions neither the zone inspector's nor the district inspector's report gives an indication that aegypti mosquitoes are present in the zone. Unless someone complains about mosquitoes, hidden foci may well go unrecognized until the Adult Capture Service inspector visits the zone and finds adult aegypti. The Producing Focus Service and the Adult Capture Service are interdependent in the eradication of the final residual foci.

The producing focus inspectors are selected from among the best of the regular zone inspectors, are given special training, and are paid a higher wage than the zone inspectors. Naturally they are expected to do high grade work. The producing focus inspector is allowed ample time to cover his area of search and is never rushed, but he knows that he is subject to the following penalties:

1. For one missed aegypti focus, suspension for one day.
2. For missing three or more aegypti foci, reduction to rank of zone inspector.
3. For generally sloppy work, dismissal.

In large or medium-sized cities in which aegypti breeding has reached a low level but refuses to disappear, excellent results can often be obtained by sending in three to five producing focus inspectors working under their district inspector to search out and destroy hidden producing foci.

Each inspector of the Producing Focus Service has an assistant; and, in addition to the usual equipment of the zone inspector, he and his helper carry:

- Ladder
- Pail
- Oilcan with three liters of oil
- Rope
- Trowel
- Iron hooks to lift manholes
- Machete
- Shovel
- Pipette for collecting larvae
- One or two kilos of cement
- Pick hammer
- Material for capture (see pp. 90-92).

The duties of the assistant are: (1) to follow the instructions of the inspector; (2) carry ladder and pail with material; (3) clean gutters, and collect, count, and bury useless and removable containers; (4) place under cover removable containers of relative value; (5) mosquitoproof water containers which cannot be removed. All the work of this helper is checked by the inspector, who assumes entire responsibility for it.

According to usual practice, each district inspector of the Producing Focus Service orients and checks the work of not more than five or six inspectors, both by working with them to observe their technique and correct their mistakes, and by working after them, visiting premises which they have already inspected, to check what they have done. When working after the inspector the district inspector should be accompanied by a helper carrying all necessary material, as only in this way can he make a thorough inspection of the work done. The district inspector submits in writing a note of any serious fault found in the work of an inspector.

The work of the producing focus inspector is oriented by:

1. The Neighborhood Infestation Report (Form FA 54) of the Adult Capture Service. This is by far the best possible indication of local breed-

ANTI-AEDES AEGYPTI SERVICE

HOUSE CAPTURE OF ADULT MOSQUITOES
NEIGHBORHOOD INFESTATION REPORT

Place. .. . . Zone . Date . .. ..

Street	No.	Block	Rooms Inspected	Minutes Worked	AEDES AEGYPTI				OTHER SPECIES		
					Caught M	Caught F	Seen but Not Caught	Total	Caught	Seen but Not Caught	Total
Total											

Note: The largest number of mosquitoes was captured______________________________

____

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____

____
Inspector

Form FA 54

On the basis of information recorded on this form the special producing focus squad is sent out immediately to search for breeding foci.

ing. Where adult aegypti mosquitoes are found, producing foci always exist nearby.

2. The Aegypti Focus Report (Form FA 122), which is used by the zone inspector, after his zone is comparatively free of aegypti, to note the location of each aegypti focus. Where the zone inspector finds larval foci only there should be some nearby pupal focus.

3. A Mosquito Complaint (Form FA 64) received from an area worked by the zone inspector is rarely due to the presence of aegypti mosquitoes. *Culex quinquefasciatus* is the most common cause of complaint. In certain seasons of the year *Aedes scapularis*, *Aedes taeniorhynchus*, and *Mansonia* may motivate complaints. Occasionally, however, a complaint is due to

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					Caught		Seen but Not Caught	Total	Caught	Seen but Not Caught	Total
					M	F					
Total											

Note: The largest number of mosquitoes was captured__________

____

____

____

____
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Form FA 54

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aegypti, in which case it is almost always against mosquitoes which bite during the day.

A species eradication campaign against the aegypti mosquito alone can be organized and maintained at but a fraction of the cost of a general mosquito service. In most cities, however, it is necessary to undertake to a certain extent the control of other mosquitoes. When it is apparent that mosquito complaints are based on the presence of mosquitoes, other than aegypti, the inspections made by the producing focus inspector are generally limited to the ground, since the most troublesome mosquitoes prefer outside breeding places on the ground.

The radius of inspection should vary in accordance with the nature of the complaint that necessitated it. In practice it has been observed that if adult aegypti are found in a house, the breeding focus is generally on the same or on the adjoining premises.

When the work is motivated by the Adult Capture Service the center of the area of action should be the room in which the largest number of aegypti, especially males, was found or, if this has not been determined, the center of the infested building. An initial radius of 25 meters is then taken, and everything coming partially or completely within it is inspected. If no producing focus is found to justify the presence of aegypti adults, this radius is increased by another 25 meters. If no focus is found within the second radius, another inspector is assigned to search the same area under the direct supervision of his district inspector.

In an inspection based on an Aegypti Focus Report (Form FA 122), indicating only larval foci, the same radius of action should be observed.

In an inspection based on a Mosquito Complaint (Form FA 64), when it seems probable that the culprits are not aegypti mosquitoes, but other species, the initial radius should be 50 meters, with possible extension to 100. The inspection may be limited to outside visits if so authorized by the director.

During inspections based on an Aegypti Focus Report or a Mosquito Complaint, the producing focus inspector should look for adults as well as larvae in the first radius of 25 meters in order to identify the cause of the trouble and to orient his search.

The decrease in aegypti adults is so rapid following the destruction of producing foci that the finding of an appreciable number of mosquitoes

ANTI-AEDES AEGYPTI SERVICE

AEGYPTI FOCUS REPORT

Zone .... Block............ Date............

Street .... No............

Type of container...

Location of container in building ....

....

Type of focus (AL or AN)......................................

Size of Focus (Large, medium, or small) ....

....

Destroyed by means of ....

Inspector..............................

Identification of species confirmed by.......................

....

Delivered to Producing Focus Service No. ....

to begin special investigation on ....(Date)

Date ....

Form FA 122 Signature ....

This form is used by the zone inspector after his zone is comparatively free of aegypti, to note the location of each remaining aegypti focus in order to facilitate the work of the producing focus inspector. It is also used for recording the mosquito breeding on boats.

ANTI-AEDES AEGYPTI SERVICE

MOSQUITO COMPLAINT

Zone .... Block .... Date . ... 19 . .....

Street and number... . . ..

Complaint made by. . . . .

Previous complaints . .. .

Hour at which mosquitoes are most troublesome . . .. .

How long have mosquitoes been noticed . . . .

Inspector .. .

Form FA 64

Measures taken . ..

.. . .

. . . . . .

Were foci found . . . How many ... .

Larvae . . Pupae . .... .

.. ..

Note: Verify whether mosquitoes still exist after eight days.

OBSERVATIONS

Form FA 64 (Reverse)

The zone inspector, or any other employee of the Yellow Fever Service, on learning of the existence of mosquitoes at any point, fills out this form for the information of the producing focus inspector.

by the Adult Capture Service ten or fifteen days later generally indicates that there still remain undiscovered producing foci. In this case the Producing Focus Service repeats it work.

Under the most favorable conditions an aegypti mosquito can evolve from egg to adult in eight days; consequently, it is customary for all buildings within the radius of the search made by the producing focus inspector to be reinspected every seven days by the district inspector, until such time as negative results are obtained.

It must be remembered that aegypti eggs, after maturation, resist desiccation for several months, and thus unexpected foci may appear in the absence of adults. All blocks with bad records as aegypti producers, and those adjacent, should be carefully inspected whenever possible, and *extraordinary* producing-focus searches should be made from time to time in the blocks considered especially suspect. Only after two or three failures of the Adult Capture Service to find adults can there be reasonable certainty that all breeding foci have been destroyed.

The work of the producing focus inspector must be thorough. All potential water containers must be carefully examined, and every room in each house must be entered. All aegypti foci found are immediately oiled or destroyed. Foci of other species, the immediate destruction of which is not possible, are reported for oiling or stocking with fish. An urgent Summons (Form FA 83) with a short period for compliance, is issued in connection with corrections of defects found by the producing focus inspector.

When the producing focus inspector finds a vacant house within the radius of his search, his helper goes for the key and inspection is duly made. This inspection is included in his report, Form FA 58, and not on the report form of the Vacant House Service. However, the date of his inspection is noted on the Vacant House Census (Form FA 59). If the key for a house cannot be obtained, the Producing Focus Service inspector hands the district inspector for the Vacant House Service a note of such a house, with the indication "urgent."

The producing focus inspector must often inspect and report on the condition of roof gutters. His instructions for this work are as follows:

1. The unit term gutter covers a length of gutter in a straight line, tangent or, curve, in which water may circulate without interruption of divisions. A gutter, then, is for statistical purposes limited by its ends, or by metal divisions.
2. When a gutter holds water the person responsible for the house is notified in writing that legal summons will be served if the offending gutter is not removed or repaired, and given sufficient declivity to guarantee prompt draining of rain water. (Sometimes a gutter may be made satisfactory by increasing the number of drain pipes.) Sections holding water should be marked below on the outside with the letter "R," using a blue wax pencil, to indicate where repairs are needed. Only as an emergency measure, and with the director's previous approval, or with written authorization of the owner, can gutters be perforated by the inspector.
3. The inspector and his helper can go on roofs with steep pitch or dangerous defects of construction, only when using a rope tied securely around the waist to prevent serious injury when slips occur. Special precautions must be taken to avoid coming in contact with live wires. Care should be taken not to damage tiles, window panes, lamps, electric wires, etc.
4. When access to the roof is possible at both the front and rear of the house by use of a ladder, the inspector climbs up twice and does not walk over the roof. Ladders are propped against the walls and never against the roof gutters.
5. When the inspection cannot be completed without walking on the roof, personnel go barefoot or wear soft shoes with rubber or rope soles. Under no circumstances is walking on a roof permitted with shoes with leather soles.
6. Roof tile which may be broken is repaired immediately by the inspector so that the roof is left in good condition. If broken tiles or other defects of the roof are found, which might later be attributed to the carelessness of the inspector, the attention of the occupants of the house is called to the defects before work is begun.
7. A thorough cleaning of gutters is not undertaken, but such refuse as obstructs them, including vegetation, is thrown out. This work is done only when it causes no loss in time;

ANTI-AEDES AEGYPTI SERVICE

SEARCH FOR THE PRODUCING FOCUS

Zone .... Block........... .... Radius of .... meters. {Begun on........ {Finished on ....

(A) Buildings

Houses inspected .. ..

Houses with F. . . . .

Houses with FP . . . .

Houses with FA. . .

Houses with FAP

Containers Found with Water	Cont. Inspected	ALL SPECIES		AEGYPTI		Cont. Elim-inated	Cont. Oiled
		Foci	Pupal Foci	Foci	Pupal Foci		
Inaccessible tanks							
Vats and tanks							
Clay vessels							
Barrels, drums, and tubs							
Sp art. deposits							
Roof gutters							
Trees and plants							
Wells and pits							
Other containers							
Totals							

Zone . . . . . Block . Street and No . . . .

Sp . . . . Found in . . . .

Destroyed by Inspector . . Responsible ? . . . ..

Zone ... Block Street and No . . . .

Sp. . . . Found in . . . .

Destroyed by. . Inspector . . . Responsible ? . ...

Zone . . Block .. . Street and No. . . . .

Sp.. . Found in . . . .

Destroyed by . .. Inspector . . . .. . Responsible ? ... ...

Form FA 38

Zone .... Block .... Street and No. ....
Sp. .... Found in ....
Destroyed by .... Inspector .... Responsible ? ....

Zone .... Block .... Street and No. ....
Sp. .... Found in ....
Destroyed by .... Inspector .... Responsible ? ....

Zone .... Block .... Street and No. ....
Sp. .... Found in ....
Destroyed by .... Inspector .... Responsible ? ....

Zone .... Block .... Street and No. ....
Sp. .... Found in ....
Destroyed by .... Inspector .... Responsible ? ....

Zone .... Block .... Street and No. ....
Sp. .... Found in ....
Destroyed by .... Inspector .... Responsible ? ....

Zone .... Block .... Street and No. ....
Sp. .... Found in ....
Destroyed by .... Inspector .... Responsible ? ....

Zone .... Block .... Street and No. ....
Sp. .... Found in ....
Destroyed by .... Inspector .... Responsible ? ....

Zone .... Block .... Street and No. ....
Sp. .... Found in ....
Destroyed by .... Inspector .... Responsible ? ....

.... Inspector of .... squad

otherwise the householder is notified that he must do it under penalty of legal summons.

8. Balls and other objects removed, which might again find their way into the gutters or onto the roofs, should be destroyed.
9. All details of the inspection, such as the number of tiles broken and repaired, the type and quantity of obstructive material found and removed, including vegetation, tin cans, etc., are noted on the reverse side of Form FA 58.
10. Superfluous gutters are removed by the inspector with the written consent of the responsible person.

In reporting the results of the work of the Producing Focus Service, each inspection within a radius of 25 meters is statistically considered as a unit, and a Search for the Producing Focus report (Form FA 58) should be made out accordingly. For example: an initial radius of 25 meters gives negative results (First Inspection, Form FA 58); afterward this radius is increased to 50 meters (Second Inspection, Form FA 58). The inspector who conducts the search notes on Form FA 2 the results of his inspection. The data from this form referring to each search within a radius of 25 meters are transferred to Form FA 58.

The producing focus inspectors and their district inspector meet every Monday afternoon, or at some other time designated by the director, to make the proper entries on Form FA 58. The number of foci found is noted after "Sp," using the abbreviations adopted by the Service. After the heading "Found in," a note is made of the type of container in which each focus was found, together with its exact location. After the heading "Radius of" is entered the distance measured from the point where each search began to the place where the focus was found. The space following the heading "Destroyed by" is filled in, with a specific statement in each case as to the measures taken to destroy the focus. After "Responsible" is registered the producing focus inspector's opinion as to the culpability of the zone inspector of the regular service. The word "yes" is written if the focus found was in an accessible water container for which the zone inspector was responsible, and "no" if the focus was found in an inaccessible container for which the zone inspector was not responsible. Care must be taken, however, to prevent possible injustice to the zone inspector. In places where the interval between visits is 14 to 28 days, foci are charged against him only when found within a few days of his visit.

Generally the producing focus inspector fills out on Form FA 15 only the sections "Producing Focus Service and Special Revision Work," and "Containers," under A. The data for filling out these sections come from Form FA 58. Care should be taken to avoid mistakes in the column headed "Searches Made—Instigated By." "Searches made" refers to the number of searches carried out and not to the number of houses visited; the same is true of the column headed "Pupal foci," under "All species" and "*A. aegypti*." Each horizontal line of the section "Houses" carries the data regarding all the searches made, based on the nature of the report which made the inspection of the Producing Focus Service necessary. No provision is made on this form for summarizing the results of the searches by zones or districts, but only those for the entire city.

Adult Capture Service

The capture of adult mosquitoes has been used for many years in the study of the density and distribution of the vectors of malaria before and after the introduction of control measures, but it has been used effectively in the control of *Aedes aegypti* only during the past decade. The reasons for the earlier use of capture for the study of anopheles than for the aegypti studies are to be found in the biology of these mosquitoes.

Anopheles are non-domestic mosquitoes which breed outside the house and may range far from their breeding places in search of a blood-meal, whereas the aegypti mosquitoes generally breed in artificial water containers in the immediate vicinity of human habitation and usually do not range widely in search of breeding places. The anopheles are generally large mosquitoes whose greatest activity is nocturnal, and when resting in houses in the daytime they are easily captured. The aegypti mosquito is a small rest-

less mosquito which is much more difficult to catch.

The capture of aegypti adults, which was introduced in Brazil in 1930 in order to provide an independent check on the work of the zone inspector by a method other than that of blindly repeating his work and incidentally his mistakes, soon proved to be the most sensitive indicator of aegypti distribution and amount of breeding for the orientation of the Producing Focus Service.

If the reported larval index is zero and adult mosquitoes are found in numbers, the larval index is false, either because of the carelessness of the regular zone inspector or because of the inaccessibility of the producing focus to this inspector. The presence of adult mosquitoes indicates the proximity of a breeding focus and leads to the finding of neglected or inaccessible foci. The presence of adult aegypti males is a sign of the immediate proximity of a breeding focus; males find the necessities of life close at hand, while the females, which need blood for maturation of ova, may travel considerable distances in search of man or animal. A careful analysis to determine the point of greatest concentration of males generally determines within 25 meters the location of these hidden foci. (This statement does not mean that all aegypti found will be within 25 meters of the producing focus.)

Aegypti mosquitoes, at least in numbers sufficient to be found by the Capture Service, rapidly disappear following the elimination of all pupal foci in a neighborhood. The capture of adults 10 to 15 days, or more, after the destruction of pupae generally indicates that other hidden pupal foci still exist.

The capture of adults is of great value in determining the aegypti density in places where antilarval work has been put on a lengthened cycle, or suspended. Under such circumstances it is often true that the zone inspector finds and honestly reports a low breeding index at a time when heavy breeding has already developed. This happens where most of the potential foci are water containers easily accessible to the occupant of the house, who takes it upon himself to empty out the water just before the visit of the inspector, thus destroying valuable evidence of the true state of affairs. The destruction of adults is not so easy and has not yet become popular. It has been observed that when the Capture Service finds adults scattered irregularly in a locality, this is generally due to inefficiency of the zone inspector, or to undue haste in lengthening the cycle of inspection. To correct such a situation it is often necessary to replace the inspector, or shorten the intervals between visits.

On the other hand, when the Capture Service finds a large number of adults at distinct points in a locality already on a lengthened cycle, the existence of hidden pupal foci should be suspected; and the finding and destruction of these by the Producing Focus Service may well result in cleaning up the locality without modification of the regular service.

The Capture Service inspectors are selected from men of marked ability who show a real interest in the service; they receive a higher salary than do zone inspectors. The inspector in the Capture Service who does not maintain a high standard in his work is reduced in rank or dismissed from the Service.

Four to six adult capture inspectors generally work under the orders of a district inspector who is responsible for itineraries and supervision of the work. In large cities the itinerary of the Capture Service is so drawn up that all the capture inspectors under a single supervising inspector work in the same district. Each inspector of the Capture Service is held responsible for one zone. His supervising inspector gives him the complete itinerary of the zone together with a map of the area. At the end of the day's work, at an agreed meeting place, the district inspector checks the number of blocks covered during the day and indicates those to be covered on the following day. Should any of the inspectors terminate the work in their zones before the others, the district inspector details them to work in the retarded zones, each inspector becoming responsible for a certain number of blocks.

Each Capture Service inspector carries the following equipment:

1. Special case with:
   Flashlight with extra bulb and three spare batteries.

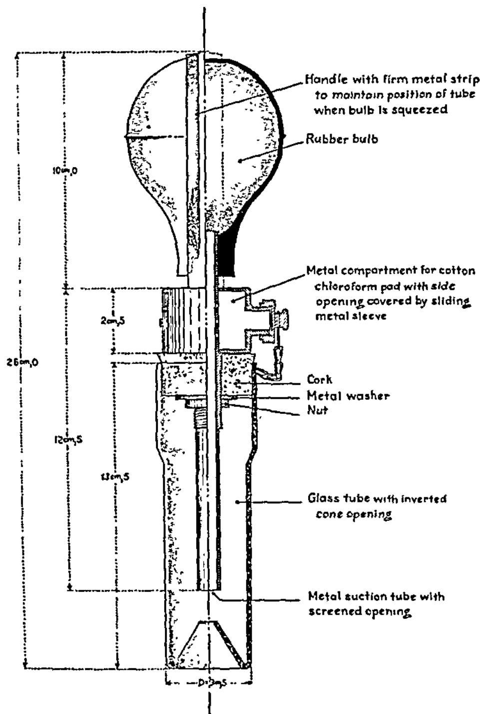


Fig. 26 Tube for capturing adult mosquitoes.

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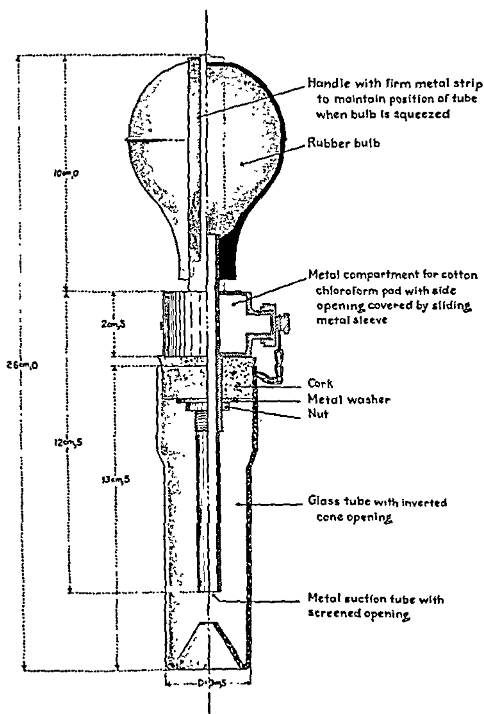


FIG. 26. Tube for capturing adult mosquitoes.

YELLOW FEVER SERVICE

MOSQUITO IDENTIFICATION SLIP

Date of capture .... Local No.................. Lab. No.................

State.............. . . County .... Town.......................

Zone...... .. Block .. .. Street..................................... No. ....

Number of mosquitoes sent .... Remarks ....

....

Captured by....................................

Identification of species by the laboratory

Identified on (date) . ... by.......................................

Form FA 116

When adult mosquitoes, captured in houses, or in any other place without the use of animal bait, are sent to the laboratory for final identification, they are accompanied by this form, typed in triplicate. After identification has been made and entered on the form, two copies of the form are sent to the regional office; from there one copy is returned to the sector office from which the specimen was received.

inspector always begins on the ground floor and goes upward a floor at a time.

The principal interest of the inspector is the capture of the aegypti mosquito; but adults of other species are captured, if for no other reason than to confirm the absence of aegypti mosquitoes. When only a few mosquitoes of each species are seen, all of them should be caught. If, however, mosquitoes of species other than aegypti are numerous, the inspector catches only those of which the identification is uncertain.

Upon completing the inspection, the inspector notes the time and verifies the number of minutes spent in the house.

Wherever adult aegypti are found in a house, the houses to the left and to the right must be

ANTI-AEDES AEGYPTI SERVICE

CAPTURE SERVICE WORK SHEET

Locality | Zone | Date

						AEDES AEGYPTI					OTHERS		FOCI			
						CAUGHT										
Street	No	Block	Rooms Inspected	Rooms not Inspected	Time Spent (in Minutes)	Females	Males	Total	Seen but Not Caught	Total	Caught	Seen but Not Caught	F	FP	FA	FAP
Totals																

Houses with F:

Houses with FP:

Houses with FA:

Houses with FAP

Abbreviations:
L—Larval
P—Pupal
A—*Aedes aegypti*
O—Other species
F—Foci

Signature of Inspector

Form FA 21

ANTI-AEDES AEGYPTI SERVICE

CAPTURE SERVICE REVISION WORK SHEET

City

Week 194–

Street		Block	INSPECTOR'S WORK								REVISION								
					AEGYPTI			OTHER SPECIES					AEGYPTI			OTHER SPECIES		
			Rooms Inspected	Time Spent	Caught	Seen but Not Caught	Total	Caught	Seen but Not Caught	Total	Rooms Inspected	Time Spent	Caught	Seen but Not Caught	Total	Caught	Seen but Not Caught	Total
Zone Inspector Date Hour at Which Inspector Worked Hour Revision Made																		
Zone Inspector Date Hour at Which Inspector Worked Hour Revision Made																		
Zone Inspector Date Hour at Which Inspector Worked Hour Revision Made																		
Zone Inspector Date Hour at Which Inspector Worked Hour Revision Made																		

District Inspector

rm FA 123

inspected in series until houses without aegypti mosquitoes are encountered. Thus the center of distribution of adults is identified as being close to the house with the greatest number of adults, especially males. This information is a valuable guide for the search to be carried out by the Producing Focus Service.

In the reinspection made by the capture inspector to determine whether or not the Producing Focus Service has eliminated all the pupal foci in a neighborhood, the same houses are visited as were visited by the capture inspector responsible for finding adults in the neighborhood

Checking the work of the inspector of the Capture Service is as important as checking that of the zone inspector. From time to time, therefore, his district inspector works with him in order to judge his ability and observe and correct his technique. It is much more difficult to ascertain the quality of the work of an inspector in the Capture Service by revision than it is in the case of a zone inspector, because there is always the possibility of mosquitoes remaining uncaught, even with the best and most conscientious worker. However, if numerous aegypti are found during revision, in a house reported by the inspector as free or almost free of these mosquitoes, it is obvious that his work is poor. Sometimes the district inspector works ahead of the inspector and purposely leaves adult mosquitoes to be caught by the inspector. An inspection is not considered a check inspection unless made within two hours of the original inspection.

In areas where anti-aegypti work has been suspended as unnecessary because aegypti was eradicated, it is essential to continue with Capture Service inspections on a quarterly cycle. In order that no house escape at least an annual inspection on the quarter-yearly cycle, work is begun in the first house of each block in the first quarter, and is staggered in the subsequent quarters.

In areas where anti-aegypti work has been suspended for longer periods because of repeated negative quarterly reports from the Capture Service, the inspection by this service may be placed on a semiannual or even annual basis. This sensitive sentinel capture service should not be discontinued entirely except on the basis of complete absence of *Aedes aegypti* for a considerable period of time over a large area, and if anti-aegypti measures exist in those contiguous areas from which reinfestation might come.

Forms Used by Adult Capture Service

Form FA 32.—The Capture Service Work Sheet (Form FA 32) is used by the capture inspector in place of Form FA 2 of the regular zone inspector. Since capture inspectors are chosen from zone inspectors no difficulty is encountered in filling out this form.

A note on the number of mosquitoes seen and not captured is of value in revision; trained inspectors report with remarkable accuracy on mosquitoes seen but not captured, as being "aegypti" or "not aegypti."

The column "Foci" is seldom used by the capture inspector, who spends all his time and energy seeking adults. Only under special conditions is the Capture Service required to look for, register, and destroy breeding foci.

Form FA 123.—The Capture Service Revision Work Sheet (Form FA 123) is used by the district inspector of this Service to record the results of his check visits to houses examined by the inspectors under his direction. The data on this form are not recapitulated on any other report form.

Form FA 54.—The Neighborhood Infestation Report (Form FA 54, p. 83) is used whenever adult aegypti mosquitoes are found. When mosquitoes are seen in several adjacent houses, the notes can be entered on a single form, which the inspector turns in to the district inspector. On this form the sex of the mosquitoes and the part of the house or room in which the largest number was caught are noted.

ORGANIZATION OF ANTI-AEGYPTI MEASURES IN THE INTERIOR

The anti-aegypti work in the interior of Brazil is essentially the same as that of the cities except that there is less need for Complementary Services. Aegypti-transmitted yellow fever may be a

tive order, after marking it "noted." All written instructions are in force until rescinded in writing. When an employee is transferred from one post to another, he must study the local regulations in the Order Book and sign each of them as though he had been present when it was issued.

The buildings in the interior vary so little in type from one locality to another that the crude house census data is used for determining the initial size of a zone without considering the types of houses in the area. During the initial stages of a campaign in the interior, the inspector assumes responsibility for a zone with 600 houses; as conditions improve the size of the zone is increased. In places with a large percentage of small houses, the zone may be even larger. The following classification is used for houses in the interior:

Mucambo: a small house with mud or thatch walls. The roof may be of thatch, tile, or tin.

One-story house: a house of somewhat better construction, made of brick or adobe, but whitewashed or painted. The roof is generally of tile or tin, but may be of thatch.

Two-story house: includes all houses with more than one story.

Areas in the interior are divided into zones which are worked in the same manner as those in the cities; the essential difference is that the urban zone is usually a compact area, whereas the interior zone may comprise one or more small towns, villages, or groups of sitios.

In Northeast Brazil the word "sitio" is most frequently used to designate a house or group of houses in a rural district, and although other words such as farm and mill are also used, the Brazilian rural service has come to be known as the "Sitio Service." A sitio may be defined as a rural area of uncertain size with one or more dwellings, known in the community by name, e.g., Sitio Bacury, Sitio Troya, etc.

Small towns and villages are grouped so as to give sufficient work for the inspector for the entire cycle of inspection. Regulations are the same as for work in sitios (see below). The term small villages is taken to mean a small group of separate houses. As a matter of fact there are many gradations between sitios and small villages. The grouping of localities in zones should be arranged after transportation facilities have been carefully studied, and due allowance has been made for the time lost in travel.

For each community in the interior with more than five hundred houses, a map with numbered blocks is made showing the demarkation of zones. A copy of this map is mounted inside a box frame with glass cover, and hung at some central point, such as a restaurant, barber shop, or store. At the close of each day's work the inspector puts a pin at the point on the map where he is to begin work on the following day, thus making it possible for the medical officer or district inspector to find him without loss of time in case of a surprise check visit.

When work is to be undertaken in a rural county an experienced district inspector gets a complete list of the sitios in the county from such authorities as the county prefect, the state tax office, and the registrar's office. The county authorities often have a rural registry from which the list of sitios can be copied with little trouble. At the same time, information regarding each sitio and the number of houses it possesses is registered. A schematic outline map of the county is made, locating each sitio, in so far as information is available, in relationship to the county seat and to other sitios This map will have, of course, many defects, but even so it is valuable in making a preliminary distribution of work in the community. The defects are corrected as rapidly as possible with information supplied by the inspector after work has begun. The sitios are grouped, according to location and means of transportation, into zones, each of which should occupy one inspector for a week. It has been found convenient to refer to this area worked by one inspector not as a zone, as is done in urban work, but as a "group of sitios." A group of sitios is, then, a number of sitios at short distances from one another worked by the same inspector during the course of one inspection cycle. The number of sitios in a group varies widely according to the number of houses in each sitio and the ease of transportation from one sitio to another in the area.

In the formation of a group of sitios only entire sitios are included, thus avoiding difficulties in checking the work and in recording the re-

sults. The whole area of a county should be completely covered by the antilarval service, and field investigations should be carried out to make sure that no sitios have been left out of the itineraries of the inspectors.

For identification, each group of sitios is designated by the name of the county to which it belongs, followed by an identification number and the name of its best known sitio: for example, "Iguatú—1st group of sitios—Brejo" indicates the first group of sitios in Iguatú, which includes the sitio Brejo. On the service map this group of sitios is entered under the name "Brejo" (see map, page 102).

Once a group of sitios is organized it is turned over to an inspector. The inspectors meet at the county seat, and each is handed a rough sketch map of the group of sitios assigned to him, with a list of the sitios in it and the number of buildings. Each inspector, before starting for the field, learns from outside sources as much as possible about the group of sitios for which he is to be responsible, and about roads and trails leading to the different sitios in the group.

The itinerary for each group takes existing roads into consideration. The first sitio of the group on the main road between the county seat and the group of sitios is considered the first on the itinerary, the others being visited consecutively in the most convenient order, avoiding all unnecessary travel.

If the inspector chances on a sitio in the area of his group which has not been previously registered, he reports it and includes it in his itinerary. If he fails to find a sitio which is included in his list, he notes this on the record sheet.

At the end of the week the inspectors meet with their district inspectors and submit the results of their first trial inspection, on the basis of which such readjustments of sitios in groups as may seem necessary are made.

Once the itinerary for a group of sitios has been established it is strictly adhered to just as is that of the urban zone. Any proposed modification in the itinerary should be submitted to the director for approval.

The results of the first trial inspection are sent to the state office for study and for registry on Form FA 47, the Locality Card.

For entry on Form FA 2, all the houses of e[...] sitio must be numbered. This is done by t[...] inspector. The first house on the itinerary [...] numbered 1, the second 2, and so on until the la[...] house of that sitio has been numbered. At th[...] next sitio the numbering begins once more at 1 [...] The number is written with a blue wax pencil on a prominent place on the house, or on a board which is furnished by the owner.

On the first house of each sitio a small board is placed, bearing a triangle, the name of the sitio, and a dot, as follows: ◀ Sitio Brejo ● to indicate that this is the first house to be examined. On the last house is placed a board with ● ◀ to indicate that this is the last dwelling in the sitio. The aim of these boards is to orient the inspector in following his itinerary exactly, especially while he is new to the zone.

Five or six groups of sitios form a rural district representing the area under the supervision of a district inspector. The districts are numbered in each county and each district has its headquarters at the county seat to facilitate communication with the sector office. The district inspector and the inspectors live in the county seat. The inspector starts his work on Monday and returns only on Saturday after finishing his itinerary.

If constant checking of the work of the zone inspector is necessary in urban districts, where the inspector is always under the direct supervision of his district inspector, it is even more important in rural districts where the inspector works a great part of the time alone. The district inspector should so arrange his own itinerary as to visit each group of sitios at least once a week. To aid in checking, the inspector affixes the Autograph House Visit Record (Form FA 52) in each house inspected. This form must be carefully filled in, as has already been explained elsewhere in this manual. The district inspector should also enter his visits on this sheet when reinspecting a house.

Form FA 2 of the Sitio Service is filled out as in urban work, except that when work in a sitio has been finished the inspector pencils the horizontal line used for the last building inspected, and below it enters the total of results of his in-spections in that sitio; in th[...]

COUNTY OF IGUATÚ

Map Showing the Division of County into "Groups of Sitios"

The twelve groups of sitios represented on this map are apparently of very unequal size and with widely varying numbers of sitios. On closer study, however, it will be seen that those with many sitios are nearer the county seat and have better travel facilities. Also, it should be noted that in certain outlying districts the sitios tend to be very large and have a large number of houses each.

Scale in Kilometers



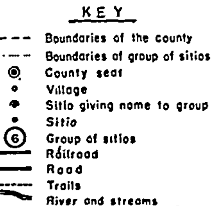


FIG. 27. Organization of Iguatú County, Ceara, Brazil, into groups of sitios for anti-aegypti work.

(B)—HOUSES

Locality .... Municipality .... Week ....

Zone or Sitio	Houses Inspected	Houses not Inspected	ALL SPECIES				AEDES AEGYPTI			
			F	Index	FP	Index	FA	Index	FAP	Index
District or Group										

Form FA 4 Supplementary

(C)—SUPERVISION

Zone or Sitio	WITH THE INSPECTOR					REVISIONS				
	Number of Houses Inspected	ALL SPECIES		AEGYPTI		Number of Houses Inspected	ALL SPECIES		AEGYPTI	
		F	Index	FA	Index		F	Index	FA	Index
Total of District or Group										

OBSERVATIONS

the name of the sitio is entered; in the column "No." the total number of houses in the sitio; in the column "Inspections" the number of houses inspected; in the column "Foci," at the right, the number of houses found with foci, according to the designations F, FP, FA, and FAP.

Below the numbers in the column "Foci," another pencil line is drawn and under it the inspector enters the indexes for each sitio, so that column "F" shows the index of all species, column "FP" the pupal index of all species, column "FA" the aegypti larval index, and column "FAP" the aegypti pupal index.

These changes make it possible to use each copy of Form FA 2 for as many sitios as it conveniently holds, without making the preparation of Forms FA 2 and FA 4 difficult.

It is not necessary to total the water containers for each sitio, as the inspector needs only one total of these for each form.

The following modifications should be observed in using Form FA 4:

1. After "Locality" the inspector enters the name of the county in which the group of sitios is situated, followed by the name of the sitio it is known by Example: Iguatú—1st group of sitios—Brejo.
2. Data referring to houses and to population are modified to agree with the latest available census data.
3. Under section (B), Mosquito Breeding by Houses (reverse side of form), are entered results of the inspection of each sitio. If the space is insufficient, Form FA 4—Supplementary may be used. The order in which the sitios are first listed on Form FA 4 is strictly adhered to afterward because it serves as an itinerary of the inspector in the field and greatly facilitates the checking of the work from the reports.
4. Under the section "Observations" is entered information regarding changes noted in the group of sitios.

Owing to the distances between sitios and between their component houses, inspectors must often have independent means of transportation. The Service does not purchase animals. Under certain conditions, however, it advances to an inspector the sum of money necessary to purchase a horse, and in some areas where travel is difficult, two horses, for use in going from sitio to sitio. This sum is deducted from his salary over a period of months. An inspector who needs a horse in line of duty receives each month a sum of money which is sufficient to pay for the maintenance of the animal plus reasonable depreciation.

There is generally much less difficulty in finding and eliminating the final hidden producing aegypti foci in the smaller towns of the interior than in the large coastal port cities. However, even in these smaller towns the elimination of aegypti breeding is greatly facilitated by the search for producing foci; and the work of the Producing Focus Service is often extended to the interior. The only administrative problems which this measure involves are those related to transportation and itineraries.

Before leaving for the interior the inspector of the Producing Focus Service is given an itinerary which he and his helper are to follow. When work in one place is finished he moves on to the next in order on his list. The itinerary is so arranged that he returns to each place worked some two to three weeks later and makes an "adult aegypti check capture." If aegypti are found, a new search is made for producing foci before moving on to the next town, where the procedure is repeated. It is at times advantageous to have two producing focus inspectors, each with his helper, working the same territory, one making the original search and the more dependable of the two making the "control capture" and check visit.

The producing focus inspector fills out the Search Record (Form FA 61). This record is made out in duplicate, one copy remaining at the local post for the information of the zone inspector and the adult aegypti capture inspector, while the other is forwarded to the central office. The capture inspector notes the results of his work, under the heading "Capture control," on the copy of Form FA 61 which was left at the local post.

The capture of mosquitoes is used as an effective means of checking indexes, and for the discovery of hidden breeding in the small centers of the interior as well as in the cities. Mobile cap-

ANTI-AEDES AEGYPTI SERVICE

SUMMARY OF LOCAL COMBINED CAPTURE AND PRODUCING FOCUS WORK

lity.	Work begun....	District inspector........
icipality	Work ended ..	Zone inspector ....
e	No. weeks affected..	Laborers........

(A) PTURES Zone	Houses in Zone	Houses Inspected	Percentage of Houses Inspected	Man-hours Worked	AEDES AEGYPTI Houses with Mosquitoes	Total Mosquitoes	Average Mosquitoes per House with Mosquitoes	Adult Mosquito Index	Mosquitoes per 100 Houses Inspected	Infested Neighborhoods	OTHER SPECIES Houses with Mosquitoes	Total Mosquitoes	Average Mosquitoes per House with Mosquitoes	Adult Mosquito Index
cluding seen but not captured														
cluding seen but not captured														
cluding seen but not captured														
cluding seen but not captured														
cluding seen but not captured														
cluding seen but not captured														
cluding seen but not captured														
otal														
cluding seen but not captured														

GROUPS	Investigations		Houses		Foci	
	Total		Inspected			
	Pos. aegypti		With aegypti		Aegypti	
	Pos FAP		With FAP		AP	

(C) ZONE SERVICE	Houses	Index	Date
Inspection cycle—days			
Zone inspector			
District inspector			
Medical officer			

(D) PREVIOUS QUARTERS	CAPTURES Including Seen but Not Captured								SERVICE GROUPS Investigations			Houses			Foci		ZONE SERVICE			
	DATE	Per cent Houses Inspected	Houses with Mosquitoes	Total Mosquitoes	Average Mosquitoes per House with Mosquitoes	Adult Mosquitoes Index	Mosquitoes per 100 Houses Inspected	Inspected Neighborhoods	Total	Pos Aegypti	Pos AP	Inspected	With FA	With FAP	Aegypti	AP	Index of Zone Inspector	Index of District Inspector	Index of Medical Officer	Cycle of Inspection

E) LAST Check on captures (including seen)	DISTRICT INSPECTOR With Inspector	Revision	Date	MEDICAL OFFICER With Inspector	Revision	Date
Houses inspected						
Houses with mosquitoes						
Mosquitoes						

Aegypti index taken ?

Measures taken

rm FA 140

the number of investigations reported by the Producing Focus Service (Section B). The number of investigations can be, and on most occasions is, greater than the number of infested neighborhoods.

It should be mentioned that the word "investigation" covers the total work of the service, and may include one or more searches. If the breeding focus is discovered in the first search, it is obvious that the investigation is finished But, if the breeding focus is not discovered during the first search, a second, a third, or even a fourth search is made in the same investigation.

In Section B, "Service Groups," the data obtained by the combined Capture and Producing Focus Service are entered only after all the searches are completed. On the line "Total" is entered the *total number of searches made*. On the line "Pos. aegypti" is noted the total number of searches which gave positive results for these mosquitoes; "Pos. FAP" means total number of searches which disclosed foci of aegypti pupae

Section C, "Zone Service," is reserved for data from the most recent Form FA 4. "Inspection cycle" refers to the number of days between visits of the zone inspector. Under the column "Houses" is noted the total number of buildings inspected by the zone inspector, by the district inspector, and by the medical officer during the last cycle of visits. It is obvious that the number of buildings entered in the space reserved for the zone inspector is, generally, smaller than the total of "Houses in zone," Column 2, Section A.

When the Capture and Producing Focus Services work during the week following the routine inspection, the inspectors of the combined Capture and Producing Focus Services check Forms FA 32 and 58 against Form FA 2 of the zone inspector, and (a) verify whether mosquito breeding has been found by the zone inspector in the same buildings in which adult mosquitoes were discovered, (b) note on Form FA 58 whether or not the zone inspector is responsible for having failed to discover such foci as are found.

In cases in which the antilarval service has been suspended in a locality under investigation, a note should be made: "Antilarval service suspended on . . . ."

In Section D, "Previous Quarters," data from Form FA 140 in the files relative to the work of the Capture, Producing, and Zone Services during the preceding three quarters of the year are entered for comparison.

Section E, "Last Check on Captures," is filled in by the district inspector, or the inspector in charge, as far as the column "District inspector" is concerned. In the column "Medical officer" data extracted from Form FA 44 in the files are entered.

In case an index can be given, the district inspector reports it on Form FA 140 after the query "Aegypti index taken." He also fills in Form FA 4 and sends it to the office, together with Form FA 140. At the top of Form FA 4 the following should be written: "Index computed on . . ." The office prepares Form FA 14 from Form FA 4, being careful to transcribe the note typed at the top of this form

After "Measures taken" (Form 140, Section E) should be noted what has been done to clean up the locality

STATISTICS

Summary Reports

The statistical section of the sector office has the very important function of making summary reports of the work of the routine service and the Complementary and Special Services of the sector. These reports are rendered on the following forms:

14, 14A: Summary of Local Anti-Aegypti Work
15: Summary for Complementary and Special Services
69: General Summary of Indexes
140. Summary of Local Combined Capture and Producing Focus Services
141. Monthly Report, Combined Capture and Producing Focus Services

The sector office prepares copies of these summary report forms for the central office and its own regional office, and it retains a copy of each form for its files. All the forms must be prepared and dispatched promptly, because reports referring to work done many weeks earlier lose much of their value. Sector directors therefore begin to forward weekly reports as soon as 60 per cent for any given week are ready. A list of the missing reports accompanies each batch sent.

MOSQUITO BREEDING BY ZONES

ZONE	ZONE INSPECTOR							DISTRICT AND GENERAL INSPECTOR						MEDICAL INSPECTOR						NAME
	HOUSES		Houses with Aegypti Foci	INDEX				WITH INSPECTOR			REINSPECTION			WITH INSPECTOR			REINSPECTION			
				ALL SPECIES		AEGYPTI		Houses Inspected	INDEX		Houses Inspected	INDEX		Houses Inspected	INDEX		Houses Inspected	INDEX		
	Inspected	*Not* Inspected		Total	Pupal	Total	Pupal		All Species	*Aegypti*		All Species	*Aegypti*		All Species	*Aegypti*		All Species	*Aegypti*	
TOTAL																				

Form FA 14 (Reverse)

states with a Sitio Service, a Form FA 14 is prepared for each group of sitios. When various localities are covered by the same inspector or same district inspector, this fact is noted under "Observations" on Form FA 14.

If for any reason, a locality is not covered during the pre-established period, Form FA 14 carries the following annotation: "This locality was not covered during this cycle owing to . . . ."

In order to standardize the system of reporting on Form FA 14 for cities with varying cycles of visits, the number of days of the longest cycle is used. Thus instead of such entries as 7/14/28 days, or 14/28 days, the entry 28 days is made.

In localities with two or more different cycles of visits in operation at the same time, Form FA 14 is prepared only at the end of each of the longer cycles; for zones with a shorter cycle only the results of the latest of the shorter cycles are entered. For example: in a city having a 14-day cycle in some zones, and a 7-day cycle in others, two cycles of visits have been made in zones visited weekly when the work in the zones with the 14-day cycle has been completed. In such cases only the results of the last weekly cycle of the zones with the 7-day cycle appear on Form FA 14.

Form FA 14A is the same as the reverse of Form FA 14 and is used for recording zone indexes in cities with such a large number of zones that all cannot be entered on the reverse of Form FA 14. It is attached to the corresponding Form FA 14 by staples placed in the left-hand margin.

Three copies of Form FA 14 are prepared weekly for each post. The original is sent direct to the central office and the first carbon copy to the regional office; the second carbon copy is filed in the sector office of origin. Whenever a new post is opened, two copies of Form FA 14, covering the work of the first week at that post, are sent to the central office.

Forms FA 15 and FA 140.—The work of the Special Services is summarized on Form FA 15 under (A) "Producing Focus Service and Special Revision Work." The data are extracted from Forms FA 58 and FA 140. Under the heading "Searches made—instigated by" (Form FA 15), the number of searches made and not the number of houses searched should be entered. The latter figure appears at the left under the respective heading. Similarly in the four columns "With," the number of searches which are positive and not the number of buildings or containers found with pupal foci, should be entered.

Section (B), "Inaccessible Tanks," on the reverse side of Form FA 15, is filled in with data from Form FA 105 (Inaccessible Tank Census and Inspection Record), and refers only to those containers which are difficult of access and are for that reason inspected by the Complementary Services rather than by the zone inspector. The number of inaccessible tanks registered at the time of the last census of such tanks is entered under the column "Previous Census." The comparison of this number with that under the heading "Inspected" gives an idea of the regularity with which such tanks are being examined.

Sections C and D, "Ditches and Wasteland Service," and "Emergency Service," are rarely used at present, since the anti-aegypti work can fulfill its mission without becoming involved in the control of all other mosquitoes. In section D, work which cannot be included in one of the other sections of Form FA 15 is entered.

On Form FA 140, under the subtitle "Mosquitoes per 100 houses inspected," the results of the work of the Capture Service are entered in colors by means of a small rubber stamp, as standardized by the Service.

When filling out Forms FA 15 and FA 140 the statistical section observes the following routine:

1. The data on Form FA 32 are transcribed to Form FA 140 as soon as the capture work has terminated.
2. The results of the searches made, which appear on Form FA 58, are transcribed to Forms FA 15 and FA 140.
3. When a search has been made on the basis of information received from the Combined Capture and Producing Focus Services, the following note is entered at the top of Form FA 15: "Work carried out as a result of information secured by the Combined Capture and Producing Focus Service."
4. When a search has been made as a result of information received from the Capture Service, the following is written at top of Form FA 15:

MOSQUITO BREEDING BY ZONES

ZONE	ZONE INSPECTOR							DISTRICT AND GENERAL INSPECTOR						MEDICAL INSPECTOR						NAME
	HOUSES		Houses with Aegypti Fod	INDEX				WITH INSPECTOR			REINSPECTION			WITH INSPECTOR			REINSPECTION			
				ALL SPECIES		AEGYPTI		Houses Inspected	INDEX		Houses Inspected	INDEX		Houses Inspected	INDEX		Houses Inspected	INDEX		
	Inspected	Not Inspected		Total	Pupal	Total	Pupal		All Species	Aegypti		All Species	Aegypti		All Species	Aegypti		All Species	Aegypti	
TOTAL																				

Form FA 14 (Reverse)

states with a Sitio Service, a Form FA 14 is prepared for each group of sitios. When various localities are covered by the same inspector or same district inspector, this fact is noted under "Observations" on Form FA 14.

If for any reason, a locality is not covered during the pre-established period, Form FA 14 carries the following annotation: "This locality was not covered during this cycle owing to . . . ."

In order to standardize the system of reporting on Form FA 14 for cities with varying cycles of visits, the number of days of the longest cycle is used. Thus instead of such entries as 7/14/28 days, or 14/28 days, the entry 28 days is made.

In localities with two or more different cycles of visits in operation at the same time, Form FA 14 is prepared only at the end of each of the longer cycles; for zones with a shorter cycle only the results of the latest of the shorter cycles are entered. For example: in a city having a 14-day cycle in some zones, and a 7-day cycle in others, two cycles of visits have been made in zones visited weekly when the work in the zones with the 14-day cycle has been completed. In such cases only the results of the last weekly cycle of the zones with the 7-day cycle appear on Form FA 14.

Form FA 14A is the same as the reverse of Form FA 14 and is used for recording zone indexes in cities with such a large number of zones that all cannot be entered on the reverse of Form FA 14. It is attached to the corresponding Form FA 14 by staples placed in the left-hand margin.

Three copies of Form FA 14 are prepared weekly for each post. The original is sent direct to the central office and the first carbon copy to the regional office; the second carbon copy is filed in the sector office of origin. Whenever a new post is opened, two copies of Form FA 14, covering the work of the first week at that post, are sent to the central office.

Forms FA 15 and FA 140.—The work of the Special Services is summarized on Form FA 15 under (A) "Producing Focus Service and Special Revision Work." The data are extracted from Forms FA 58 and FA 140. Under the heading "Searches made—instigated by" (Form FA 15), the number of searches made and not the number of houses searched should be entered. The latter figure appears at the left under the respective heading. Similarly in the four columns "With," the number of searches which are positive and not the number of buildings or containers found with pupal foci, should be entered.

Section (B), "Inaccessible Tanks," on the reverse side of Form FA 15, is filled in with data from Form FA 105 (Inaccessible Tank Census and Inspection Record), and refers only to those containers which are difficult of access and are for that reason inspected by the Complementary Services rather than by the zone inspector. The number of inaccessible tanks registered at the time of the last census of such tanks is entered under the column "Previous Census." The comparison of this number with that under the heading "Inspected" gives an idea of the regularity with which such tanks are being examined.

Sections C and D, "Ditches and Wasteland Service," and "Emergency Service," are rarely used at present, since the anti-aegypti work can fulfill its mission without becoming involved in the control of all other mosquitoes. In section D, work which cannot be included in one of the other sections of Form FA 15 is entered.

On Form FA 140, under the subtitle "Mosquitoes per 100 houses inspected," the results of the work of the Capture Service are entered in colors by means of a small rubber stamp, as standardized by the Service.

When filling out Forms FA 15 and FA 140 the statistical section observes the following routine:

1. The data on Form FA 32 are transcribed to Form FA 140 as soon as the capture work has terminated.
2. The results of the searches made, which appear on Form FA 58, are transcribed to Forms FA 15 and FA 140
3. When a search has been made on the basis o information received from the Combined Capture and Producing Focus Services, the follov ing note is entered at the top of Form FA 1 "Work carried out as a result of informati secured by the Combined Capture and Produ ing Focus Service."
4. When a search has been made as a result of formation received from the Capture Serv the following is written at top of Form FA

"Search carried out as a result of information received from Capture Service."

As soon as the originals of Forms FA 15, FA 32, FA 58, and FA 140 are received in the office, they are checked, and four copies each of Forms FA 15 and FA 140 for the sector are typed, three copies of which are attached to the weekly statistical report and forwarded to the regional or central office. The fourth copy of Form FA 140 is filed with the corresponding Forms FA 14, FA 15, and FA 140. For localities without antilarval service, and hence having no Form FA 14 during the current year, the copies of Form FA 140 are kept in special files.

Form FA 69.—This form, General Summary of Indexes, is a concise summary of all the work relating to the control of breeding foci in each sector. Its principal purpose is to give in summary form information for the outside authorities who may be interested in the work of the Service. Five copies are made up: the original and one copy are sent direct to the central office; one copy goes to the regional office; one is sent routinely to the State Public Health Department; and the last is filed in the sector office of origin.

Form FA 141.—A summary of the data on Form FA 140 is presented on Form FA 141. When the answer to the question (Form FA 140) "Aegypti index taken?" is in the affirmative, Form FA 141 is typed in triplicate in the sector office and copies are submitted to the central and regional offices, together with the supporting Form FA 140. Last carbon copies are filed by localities in the sector office. A small spot map presenting the data given on Form FA 141 is attached to the form.

Form FA 47.—Statistical sections are responsible for the preparation of Locality Cards (Form 47) and for keeping them up to date. A locality card is made for each place where work is carried on. The cards may be used also to record pertinent information on other localities, which may be needed later. Some locality cards can give only the census figures. Data to be entered when available are: date of opening or closing of antilarval work; length of cycle of visits; date on which cycle was modified; transfer of the locality to other posts; date of opening or closing viscerotomy posts; date of occurrence of confirmed or suspect cases of yellow fever; aegypti indexes, with date, etc. For localities in which antilarval work has been suspended, results of quarterly captures are entered. The cards are made out in triplicate. Two copies are sent to the regional office, which forwards one to the central office; the third is filed in the office of origin.

Form FA 95.—Current data for the Locality Card (Form FA 47) are entered on Form FA 95. The form is prepared by the statistical section each week in triplicate. The original is sent direct to the central office; the first carbon goes to the regional office together with the diary of the medical officer; the second carbon is filed at the sector office of origin, by weeks. On this form are reported all changes in the antilarval work of a post, such as modification of the cycle of visits or suspension of activities, and all new data relating to the control and viscerotomy posts in the area. These data are transcribed to Form FA 47 in the office of origin and in the offices that receive Form FA 95.

For localities with a zero aegypti index and for those where antilarval work has been suspended, the results of the visits made by the Capture Service, whether on a quarterly or a semiannual cycle of visits, are entered on Form FA 95 for the week in which the inspection was made.

Form FA 111.—Each sector office also prepares in triplicate on the last day of every quarter Form FA 111, which is self-explanatory. The data reported are only those which are in the office on the last day of the quarter, when the reports are prepared. These reports are not to be held up awaiting data which have not yet arrived at the local office.

Form FA 44.—This is a special weekly summary form used by health officers and general inspectors for check visits in the zones, and by the Complementary and Special Services. District inspectors use this form at times instead of Section C of Form FA 4.

After each check visit to an area the person checking should compare his findings with those of the zone inspector (Form FA 2). Foci discovered during revision, but which had already been found and noted in the inspector's report and for the elimination of which proper meas-

(B) INACCESSIBLE TANKS

Cycle . .. days Cycle began .. ... Total No. of inspections during cycle ....

Condition	Previous Census	Inspected
Mosquitoproof		
With fish		
Disconnected		
Covered		
Open		
Total		

Inaccessible tanks found with foci during period covered by this report.

All species

Total .. ..

Pupal .. ..

Aegypti

Total.. ... ...

Pupal ... ...

(C) DITCHES AND WASTELAND SERVICE

Ditches dug (in meters)........... ....

Ditches cleaned (in meters) .. . .

Land cleaned (sq m.)....... . .. .

Tin cans, etc., destroyed. ....

Other work ....

(D) EMERGENCY SERVICES

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quarter and
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: spot maps

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Form FA 69
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to other post

(E) PERSONNEL

(1) Producing Focus Service and Special Revision Work

Personnel	Employees of Y.F.S.	Paid by Others	Total
District inspector			
Insp. Special Service			
Extra inspectors			
Day laborers			
Total...........			

(2) Inaccessible Tanks

Personnel	Employees of Y.F.S.	Paid by Others	Total
District inspector			
Insp. Complementary Service			
Extra inspectors			
Day laborers			
Total			

(3) Ditches and Wasteland Service

Personnel	Employees of Y.F.S.	Paid by Others	Total
District inspector			
Insp. Complementary Service			
Extra inspectors			
Day laborers			
Total...........			

(4) Emergency Service

Personnel	Employees of Y.F.S.	Paid by Others	Total
District inspector			
Insp. Complementary Service			
Extra inspectors			
Day laborers			
Total...........			

ures had been *taken in accordance with* Service regulations (requisition for fish or oil, or Note for Legal Summons), are not counted against the inspector as missed foci; and a circle is placed around the entry on Form FA 44 to indicate that it was *not* his fault. In the reinspection index only those foci are listed which have been missed, or which could have been eliminated by the inspector but were not.

In case the reviser inspects a building which was inaccessible at the time of the regular inspector's visit, *this inspection is not considered as a* reinspection but is entered in the zone inspector's report as if he himself had made the visit.

The health officer and the general inspector make copies of Form FA 44 which go to the section of statistics for entry of data under the proper headings on Form FA 14. The copies of Form FA 44 should be filed in chronological order to afford easy access to their data for appraisal of the work at any time.

Form FA 121.—The medical officer in charge, when making inspection trips, carries with him a folder of Forms FA 121, containing one sheet for each place to be visited. At each place inspected, he enters on the proper form, in ink, whatever data are indicated. The statistical section transcribes all new entries to typed copies of Form FA 121, a file of which is kept in the office.

Maps and Charts

The work of the Yellow Fever Service is portrayed graphically on maps and charts.

A small spot map is prepared monthly by each sector office to show the progress of anti-aegypti work in the sector and the observed results from the beginning of the cycle to the end of the month in question. This is attached to Form FA 14 of the sector and sent, together with this form, to the central office on the first day of each month.

A similar small spot map presenting the data tabulated on Form FA 141, the Monthly Report of the Combined Capture and Producing Focus Services, is prepared to accompany this form. The work of these combined services, for quarterly periods is portrayed on wall spot maps which are on display at the offices. Two of these wall maps hang in each office, one showing the results of the work in the current quarter and the other the results for the preceding quarter.

The symbols used in making the spot maps are as follows:

1. Black circle: locality included in the quarterly program of the Capture Service which has *not* yet been inspected during the quarter.
2. Blue circle: locality inspected during the current quarter in which no evidence of aegypti mosquitoes was found.
3. Yellow circle: locality found to have less than 10 aegypti adults per 100 buildings inspected.
4. Red circle. locality found to have 10 or more aegypti adults per 100 buildings inspected.

Each office has on display an initial aegypti survey wall map which shows, by means of colored glass map pins, the initial distribution of aegypti found in the area for which the office is responsible. This map is helpful in estimating progress in species eradication. The symbols used on the map are:

Blue pin: *locality completely free of aegypti.*
Red pin. locality infested with aegypti.

A map of posts and cycle of inspection is kept by each sector and regional office for its respective territory. On this map each place with antilarval work and the corresponding cycle of visits in effect is indicated by means of the following symbols:

Red pin: post with 7-day cycle.
Yellow pin: post with 14-day cycle.
Blue pin: post with 28-day or longer cycle.
Black pin: post with zero index in which work has been suspended.

Each office of the Service is provided with blank wall charts, 24 by 36 inches, for registry of the aegypti indexes and the results of the captures of adult mosquitoes reported by the Combined Capture and Producing Focus Services. On these charts one can easily follow the work week by week for the entire year. The names of all places with antilarval work and of all places included in the quarterly program of the Combined Services are written in ink at the left of the chart. A separate chart is made for each state each year.

After the name of the post, there is entered

ANTI-AEDES AEGYPTI SERVICE

GENERAL SUMMARY OF INDEXES

Sector or Region.................... Week of the Year.................... Date ....

Locality	INDEXES OF ZONE INSPECTORS							DISTRICT AND GENERAL INSPECTORS						INSPECTIONS BY MEDICAL OFFICERS						
	HOUSES		Houses with Aegypti Foci	INDEX OF ALL SPECIES		AEGYPTI INDEX		WITH INSPECTOR			REVISION			WITH INSPECTOR			REVISION			Name
	Inspected	Not Inspected		Total	Pupal	Total	Pupal	Houses In-spected	Index All Species	Aegypti Index	Houses In-spected	Index All Species	Aegypti Index	Houses In-spected	Index All Species	Aegypti Index	Houses In-spected	Index All Species	Aegypti Index	
Totals............																				

Form FA 44

ANTI-AEDES AEGYPTI SERVICE

MONTHLY REPORT—COMBINED CAPTURE AND PRODUCING FOCUS SERVICES

State or Region. . . . . Month . . . . Year. . . . .

Locality	Houses in Locality	Houses Inspected by Capture	Percentage Inspected by Capture	DATE		CAPTURES OF AEGYPTI—INCLUDING SEEN BUT NOT CAPTURED					RESULTS—PRODUCING FOCUS SERVICE			ZONE SERVICE				
				Begun	Ended	Houses with Mosquitoes	Total Mosquitoes	Ave Mosquitoes per House with Mosquitoes	Index—Adult Mosquitoes	Mosquitoes per 100 Houses Inspected	Houses Inspected	Houses with Pupal Foci	Pupal Foci	Date—End of Last Inspection Cycle	Length (in days) Last Inspection Cycle	Aegypti Index—Last Inspection Cycle	Date of Last Inspection by Medical Officer	

FA 141

ANTI-AEDES AEGYPTI SERVICE

LOCALITY CARD

Locality . . . . Municipality . . . . Sector . . . .

Altitude . . . . Meters Location . . . . State . . . .

CENSUS						INDEX				CAPTURE OF MOSQUITOES			
Date	BUILDINGS				Inhabitants	Date	BUILDINGS		Aegypti Index	Date	BUILDINGS		Adult Aegypti Index
	M	O	T	Total			Inspections	Aegypti Foci			Inspections	Aegypti foci	

Form FA 47

This is a card (5 by 8 inches) of heavy white paper suitable for filing. In the section "Census" the buildings are classified as "M" (mucambo, a small house with mud or thatched walls), "O" (one-story house), or "T" (two-story house). In the columns "Inspections" under "Index" and "Capture of Mosquitoes," the abbreviations "M," "I" and "C" are used to show whether the examination was made by the medical officer, the inspector, or the adult capture squad.

ANTI-AEDES AEGYPTI SERVICE

SUPPLEMENTARY DATA FOR LOCALITY CARDS (FORM 47)

State .... Week. . . .. No. of week of year ..... 19 . ...

Locality	Municipality	Date	Remarks

Form FA 95

Medical Officer

Region

ANTI-AEDES AEGYPTI SERVICE

QUARTERLY REPORT—CAPTURE SERVICE

State or Sector . . . . Date. . . . . .

Name of Post	1 Week of Last Quarterly Report Received	2 Inspector's Aegypti Index (Total)	3 Cycle of Visits	4 Number of Houses Latest Census	5 Post Opened during the Quarter (Date)	6 Post Closed during the Quarter (Date)	7 Inspections Made by the Capture Service during the Quarter—According to Latest Available Data in the Office	8 Aegypti Adults (Including Those Seen), Captured during the Quarter—According to Latest Available Data in the Office

Form FA 111

KEY: COMPLEMENTARY AND SPECIAL SERVICES

I.T.—Inaccessible Tanks
V.H.—Vacant Houses
P.F.—Producing Focus
R.S.—River Service

ANTI-AEDES AEGYPTI SERVICE

CHECK VISITS

Made by: . . . .
Category . . . .
Week . . . . from . . . . , to . . . . . .

Locality	Zone	WITH INSPECTOR				REVISION WORK				CAPTURES									
										WITH INSPECTOR					REVISION				
											AEGYPTI		OTHERS			AEGYPTI		OTHERS	
		Houses In-spected	All Species Foci	Aegypti Foci	Aegypti Pupal Foci	Houses In-spected	All Species Foci	Aegypti Foci	Aegypti Pupal Foci	Houses In-spected	Capt.	Seen	Capt	Seen	Houses In-spected	Capt.	Seen	Capt.	Seen

OBSERVATIONS: IMPRESSION OF THE WORK

ANTI-AEDES AEGYPTI SERVICE

ANTI-LARVAL POST RECORD

State.... .. .. Municipality............. .. .. Post.......... ....
Post inaugurated on. .. . .

Observations and notes on the visits of medical officer and the progress of the service:

Form FA 121

(in pencil, so that changes can be made from time to time) the number of its buildings, taken from the latest census data. In the following columns, one for each week of the year, are entered the aegypti indexes, taken from Form FA 14 for the corresponding weeks.

The work of the Capture Service is entered on the same chart by means of square rubber stamps and transparent inks of different colors. The results are stamped lightly over the aegypti indexes, if any, which have already been entered in ink by hand. The standard conventions for the stamping are:

Blue: locality in which no aegypti were found by the Capture Service.

Yellow: locality with less than 10 aegypti per 100 buildings inspected.

Red: locality with 10 or more aegypti per 100 buildings inspected.

M: this letter is stamped, in addition to other data, whenever there has been medical supervision in a place in a given week.

LEGAL ENFORCEMENT

Under the terms of Decree No. 21,434 of May 23, 1932, the regulations of the Yellow Fever Service of Brazil are applicable throughout the country. The medical officers of the Service become thoroughly familiar with these regulations in order to be able to apply them advantageously. No interest other than that of the Service is considered in the application of legal sanctions. Under no circumstances are they to be used for persecution or revenge

The penalties established, in Article 7 of this Decree, for permitting mosquito breeding in one's home are not usually enforced, unless opposition to the milder provisions of the Decree is apparent In cases of necessity full penalties are imposed.

To avoid discrediting the authority of the Service, legal action, once begun, is carried through to its satisfactory conclusion. An up-to-date, efficient system for checking on the status of each summons which has been issued is essential. The routine is as follows: The inspector carries with him an original and one copy of the Summons (Form 83), already signed by his district inspector and stamped with the proper warning. Except in special cases, a summons has an expiration limit equal to the length of the cycle of visits of the inspector. (In a post with a 7-day cycle the time limit is 7 days; in one with a 14-day cycle, it is 14 days, etc.)

Rubber stamps bearing the following instructions are kept on hand for use on summonses:

1. Cut down weeds and clean up the grounds at the above address. Bury or put under cover all rubbish, empty cans, coconut shells, broken glass, or any object which can hold water, in order to prevent breeding of mosquitoes. (Black stamp.)
2. Mosquitoproof the inaccessible tanks in the manner prescribed by the regulations of the Service (Blue stamp)
3. Repair the cesspool, cementing all cracks. Repair pipes and screen ventilators with wire cloth. (Violet stamp.)
4. Bury all rubbish on the grounds of the above address. (Red stamp.)
5. Repair, destroy, or substitute the roof gutters at the above address so as to prevent mosquito breeding (Green stamp)
6. Mosquitoproof all water containers at the above address, under penalty of fine. (Rose-colored stamp.)

Having these stamps in different colors facilitates the handling of summonses.

These types of notices cover about 80 per cent of all infractions found In special cases additional rubber stamps may be prepared according to local needs and conditions.

When irregularities are found the inspector secures the name of the person accountable. Tenants are held responsible for all repairs incidental to the use of the house, owners for making necessary permanent improvements and for correcting defects in construction. When the responsible person does not live in the building involved, the inspector delivers the Summons to him in person only if he lives at a place not more than 100 yards distant from this point. If the distance is more than 100 yards the inspector hands the Summons to the district inspector, after writing the address of the recipient on the back of the Summons. The Summons is then delivered by the inspector within whose itinerary the house lies or by the district inspector.

Zone ......

Original

No.

YELLOW FEVER SERVICE

SUMMONS

In accord with Articles 4 and 40 of Decree No. 21,434 of May 23, 1932, which establishes penalties for noncompliance,

Mr..... ....

Residing at . . ..

Is hereby notified to comply with the following instructions within .... days:

(Stamp)

Date... .... 19.. .

I hereby declare that I have received a copy of this Summons, which was delivered at................ o'clock today.

Date.... . ...

Address.....................................

Signature of Recipient

Form FA 83

Street .. .. No..... .... Zone ....

DELIVERY

Date . ... Received by inspector . .

To be delivered on . . .. . Results.. .

Date . . .

Signature of Inspector

Street No.. Zone

DELIVERY

Date . Received by inspector

To be delivered on Results .

Date .

Signature of Inspector

Street . ... No. . . Zone .

DELIVERY

Date . . . Received by inspector . .

To be delivered on . . . Results .. ..

Date ....

Signature of Inspector

Form FA 83 (Reverse)

When the recipient lives in another district the Summons is handed to the general inspector at the first opportunity (generally on a Monday), and he has it delivered in the most convenient way.

Copies of all summonses must be returned for verification to the inspector who issued them. When the responsible person does not live at the place involved, and delivery requires a day or two, the time limit for compliance is shortened so that the zone inspector can make the verification at his next regular visit. If the original time limit is adhered to, with the result that the zone inspector cannot make the necessary verification, the district inspector makes it.

Each Monday morning the district inspector distributes the summonses which are to be verified in the course of the week. If the zone inspector finds that a summons has not been complied with, the responsible person is notified that a fine will be imposed if the matter is not immediately attended to; and that early in the following week another verification will be made. This verification is made when the final Summons is delivered.

The results of the verification are written on the back of the first Summons and this is delivered to the district inspector the same day. If for any reason it is impossible to make a verification (house locked, refusal of admittance) the reason is written on the back, and the district inspector makes the verification himself if the reinspection does not fall conveniently into the regular schedule of the zone inspector.

At the weekly Monday morning meetings of the district inspectors, they deliver to the office all summonses which have been verified.

The person in charge of legal notices checks them for errors and omissions. Repeated lapses on the part of a district inspector are brought to the attention of the medical officer.

At this same meeting the district inspectors receive the final summonses or notices of fines levied, which have been made out in the office. These documents are delivered to the responsible persons by the district inspector, or by the zone inspector, providing this can be done without interfering with his itinerary.

When a final Summons is delivered the responsible person is advised that he will be fined if he does not carry out the demands stipulated in the Summons, and that another verification will be made within 48 hours.

The delivery of a final Summons is made in the same way as that of the first Summons. However, in this case even more care is taken to secure the signature of the responsible person.

The correction of the infractions which necessitated the final Summons is verified within 48 hours after delivery of the Summons. This verification is made by the district inspector or, if convenient, by the zone inspector. A notation is made as to whether or not the Summons has been complied with.

APPENDIX

DECREE NO. 21,434 OF MAY 23, 1932, APPROVING THE REGULATIONS OF THE SERVICE FOR THE PREVENTION OF YELLOW FEVER IN BRAZIL

Article 1.—Personnel of the Yellow Fever Service shall visit weekly, unless in the judgment of the Service there should be reasons justifying a shorter or longer inspection cycle, all premises, inhabited or otherwise; private and collective dwellings, including kitchen gardens, outhouses, open sheds, etc ; factories, shops, commercial and industrial establishments, colleges, retreats, convents, churches, monasteries, cemeteries, hospitals, markets, hotels, restaurants, boardinghouses, stables, barns, barracks, prisons, forts, islands, dry docks, ship docks, stores of every kind including explosives or inflammable materials, military and civil aerodromes, all means of transport, whether by land, sea, river, or air; lots, parks, and public places; gardens and all similar places.

Section 1.—The above-mentioned premises shall be minutely inspected in all their various parts, outside and inside, including rooms and sleeping quarters.

Article 2.—Physicians of the Service and their representatives shall have immediate free entry at all times to all places mentioned in the previous article in order to make the prescribed inspections.

Article 3.—Said inspections shall be made for the following purposes:

a. to prevent the breeding of mosquitoes.

b. to discover and destroy in accordance with the measures prescribed by these regulations the actual and potential breeding places of mosquitoes.

c. to indicate methods for the correction of the irregularities detected which have a bearing upon the prevention of yellow fever

d. to collect any information of interest to the Service.

Section 1.—Physicians of the Service and their representatives shall advise, summon, and, by legal procedure, compel those concerned to remedy the defects encountered during inspections.

Article 4.—Anyone who in any way opposes, hinders, or raises obstacles to the public health work defined in these regulations shall be liable to a fine of from $5 to $50 (this to be doubled in subsequent offenses) or imprisonment of from three to thirty days.

Section 1.—The penalty laid down in this article may, at the sole discretion of the Service physician, be held in abeyance for a period of forty-eight hours in order to allow the offender an opportunity of adducing justification. If, on the expiry of the period of grace this has not been produced, or if it is found inacceptable to the Service, notification of the penalty will be duly given and the penalty enforced.

Section 2—When persuasive and coercive methods have been exhausted, recourse shall be had to the police authorities for the enforcement of the Service regulations

Section 3—In cases of insolence or abuse, in addition to the penalty threatened in the present article, proceedings shall be taken in competent courts.

Article 5.—Unoccupied premises which cannot be visited because the address of the person holding the keys is unknown, or because he delays in producing or refuses to produce said keys, or makes other difficulties, shall be placed under seal until facilities for inspection are afforded.

Section 1—In such cases, the Service shall proceed to open the premises, in the presence of police authorities, in order to make the inspection, after which they shall be reclosed and sealed.

Article 6.—No occupation permit shall be furnished unless all the provisions of these regulations have first been fully satisfied.

Article 7.—The occupant of the premises on which mosquito breeding places have been found, either in the interior of said premises or in outhouses or the like, shall be liable to a fine of from $.25 to $2.50, this to be doubled in the event of a subsequent offense.

Section 1—All places and localities referred to in Article 1 of these regulations shall come within the ambit of the above article.

Article 8.—Whenever a Service employee finds a mosquito breeding place, he shall destroy the receptacle in which it was found, or, alternatively, apply the larvicide used by the Service.

Section 1.—Water containers (potential breeding places) which are not sufficiently mosquito-proofed shall be dealt with in conformity with the

above article, because the indications given under Article 3 *of these regulations have not been* obeyed.

Article 9.—Procedures of formal summons and prosecution shall be organized in conformity with the existing rules of the National Department of Public Health.

Section 1.—The summons must be signed by one of the Service physicians.

Section 2.—The charge must be *signed by the* inspecting employee who detected the irregularity.

Section 3.—The fine may be imposed only by one *of the* Service *physicians.*

Article 10.—The mosquitoproof closing of all water containers, of every description, is obligatory.

Section 1.—This must be done by the persons in charge of said containers.

Section 2.—The overflow outlets of all water containers must be protected against mosquitoes.

Section 3.—The utmost vigilance shall be exercised *by the occupants of all premises, especially* in regard to taps, water piping, rainwater spouts, etc., so as to avoid leaks and stagnation of water.

Section 4.—Infringement of this article shall be punishable by a fine of from $.25 to $2.50, this to be doubled in the event of a subsequent offense.

Article 11.—Whenever a domestic water tank is opened for inspection, cleaning, or repair, the party responsible shall immediately close it again in such a way as to make it mosquitoproof, on penalty of a fine of from $.50 to $5, this to be doubled in the event *of a subsequent offense.*

Article 12.—Water containers shall always be situated in places easily accessible to the inspectors; wall tanks shall be placed not *less than fifteen* centimeters from the walls and sixty centimeters from the ceiling or roof.

Section 1.—Proprietors are forbidden to keep objects on the lids of water tanks.

Section 2.—Proprietors are obliged to supply a means, such as a ladder or the like, to facilitate the inspection of wall tanks that are considered not easily accessible by the Service.

Article 13.—Automatic flushing-tanks shall be so placed as to permit inspection of the interior.

Section 1.—*These tanks shall be maintained in* perfect working order.

Article 14.—Where there is a constant supply of water, domestic tanks *shall not be permitted.*

Article 15.—In areas where there is an adequate water supply, the storage of water in barrels, tubs, tins, and similar vessels is prohibited under penalty of the immediate destruction of these receptacles.

Section 1.—Otherwise the following exceptions may be allowed at the discretion of the Service:

Barrels, large earthenware vessels, and other similar water containers, all of which must conform to the models approved by the Service, will be tolerated, provided, however, that they be either mosquitoproofed or kept constantly stocked with larvivorous fish of a species approved by the Service.

Section 2.—*Artificial lakes and also basins which* usually contain water shall be stocked with larvivorous fish of a species approved by the Service.

Section 3.—The duty of providing and maintaining the stock of fish mentioned in the article shall rest with the occupant.

Article 16.—Only basements which may easily be inspected and will absolutely not collect water shall be allowed.

Section 1.—Should it be found quite impossible *to satisfy the requirements of this article in respect* to inspection facilities, the proprietor shall be compelled, at the discretion of the Service physician, to install suitable trap doors in the flooring, the specifications of which, as regards the number and location, shall be determined by the Service physician himself.

Section 2.—Basements shall not be used as hen houses or as accommodation for animals of any kind.

Article 17.—Drains and sewer-traps shall not be *allowed in places where they would be* difficult to inspect.

Article 18.—The pavement of open areas and of *walks shall be level, without any depression,* and have a sufficient incline for the water to drain away readily.

Article 19.—Channels *shall* be so *maintained that* the water cannot be retained at any point along their courses.

Article 20.—Ornamental work, façades, eaves, stone carving, roofs, and awnings of buildings shall be constructed in such a manner that they cannot collect water.

Article 21.—Topping of walls with broken glass or broken bottles is prohibited.

Article 22.—Existing edifices, as well as those constructed thereafter, shall have only such roof gutters *as are absolutely indispensable.*

Section 1.—Such roof gutters must have a sufficient capacity and slant to ensure that rainwater *will never be retained at any point.* In addition, they shall be provided, at distances of not less

than six meters, with discharge pipes made of material which is not easily crushed.

Section 2.—Roof gutters or rainwater discharge pipes may not be used to drain off any other water, including the overflow from wall tanks.

Article 23.—Wherever there are roof gutters, the proprietor in charge shall arrange that the roofs are easily accessible for the inspection of said gutters.

Article 24.—Metal roofs shall not be constructed of sheet metal that can be easily bent and may therefore collect water in the depressions thus formed.

Article 25.—Acting upon the findings of roof-gutter inspections, the Service physician shall summon or take legal action against the responsible party so as to obtain the prompt correction of the defects observed.

Section 1.—In case of noncompliance with the summons, the roof gutters found to be defective shall either be removed or perforated by the personnel of the Service itself according to the Service physician's ruling.

Article 26.—Storm sewers shall be kept clean by the responsible parties, each of whom shall ensure the cleansing of the particular section of the system for which he is answerable.

Article 27.—Storm sewers, as well as manholes of electrical underground power lines, telephone cables, and the like, and also the places used for inspection purposes by the city water and fire departments, shall be so arranged that they cannot collect water and shall be closed in such a manner as to be mosquitoproof.

Article 28.—Drinking water receptacles for animals in the public livery stables, stable studs, poultry yards, etc, shall be so designed that they can be quickly and completely emptied.

Section 1.—To that end the said drinking receptacles should be designed in the form of a truncated cone.

Section 2.—Infringements of this article shall be punishable by a fine of from $2.50 to $25, this to be doubled in the event of a subsequent offense.

Article 29.—Flower-vases, jars, jardinières, and other ornamental articles in cemeteries, shall never be allowed to contain water.

Section 1.—All these receptacles shall be permanently filled with sand.

Section 2.—Mausoleums, vaults, and burial urns shall be maintained in such condition as not to collect water.

Section 3.—Cemetery administrators shall be responsible for ensuring that water does not collect in excavations and tombs.

Article 30.—In the construction of buildings, and in any work involving excavation, no stagnant water shall be allowed to remain.

Section 1.—In foundations or cellars where water accumulates through infiltration or rain, the party responsible shall be obliged to apply oil weekly at his own expense.

Section 2.—Infringements of this article shall be punishable by a fine of from $5 to $50, this to be doubled in the event of subsequent offenses.

Article 31.—Wells, in areas where permitted, must be closed in such a way as to be mosquitoproof and provided with pumps or, if of the open type, kept permanently stocked with larvivorous fish of the species indicated by the Service.

Section 1.—Furthermore, whenever possible, the well shall be completely and permanently filled in by the responsible party.

Section 2.—The adoption of one or other of the above expedients shall rest with the Service physician.

Section 3—Infringements of this article shall be punishable by a fine of from $2 50 to $25, this to be doubled in the event of subsequent offenses.

Article 32.—Spring water shall be caught and run off through pipes by the owner or tenant so as to prevent the breeding of mosquitoes

Section 1.—Infringements of this article shall be punishable by a fine of from $5 to $50, this to be doubled in the event of subsequent offenses.

Article 33.—In public and private gardens and parks, control cocks for watering purposes shall be so arranged as to prevent the collection of water.

Article 34.—In order that drains may be treated with larvicides without inconvenience, they must never discharge into artificial ponds.

Article 35.—Plants which, by the arrangement of their foliage, are able to collect water and thus serve as places for the breeding of mosquitoes shall, at the discretion of the Service, be destroyed.

Article 36.—The use of unsplit bamboo for the construction of enclosures or as stakes is prohibited.

Article 37.—The use of bamboo poles shall be permitted only when they are so treated that the ends cannot collect water.

Article 38.—Cavities in trees must be filled with concrete.

Section 1.—This must be done by the owner of the property or his tenant.

Article 39.—Devices of a type able to hold water for protecting plants, beehives, etc., from ants shall not be permitted and shall accordingly be destroyed.

Article 40.—All kitchen gardens, orchards, vacant

lots, and commons inside of the limits determined by the Service shall be kept cut and free from tin cans, pans, and other like receptacles which can collect water.

Article 41.—Any person who at any time litters the ground with tin cans, pans, dishes, glassware, pottery, and other articles capable of collecting water shall be punished by a fine of from $.25 to $2.50, this to be doubled in the event of subsequent offense.

Article 42.—Owners of land or gardens containing natural pools or marshy tracts shall be required to drain them or, as an alternative, fill them in, under penalty of a fine of from $5 to $50, this to be doubled in the event of a subsequent offense.

Article 43.—Ditches, small streams, and gullets shall be kept clean and unobstructed by the responsible parties so that there is always sufficient current of water to make the breeding of mosquitoes impossible.

Section 1.—Banks and beds shall be rectified, freed from weeds, and when the Service physician judges necessary, equipped with protective and supporting structures.

Section 2.—Infringements of this article shall be punishable by a fine of from $2.50 to $25, this to be doubled in the event of a subsequent offense.

Article 44.—Animals running loose on public highways or in open fields where there are ditches shall be rounded up, the Service calling upon the reponsible municipal department for assistance in the matter.

Section 1.—If any damage is sustained, the owners of the animals concerned shall be liable to the penalties described in this article.

Section 2.—The guilty parties shall be fined from $1 to $5, this to be doubled in the event of a subsequent offense.

Article 45.—Ironware in industrial yards, storage depots, stockyards, and the like shall be kept in such condition as to preclude the collection of water.

Section 1.—Infringements of this article shall be punishable by a fine of from $10 to $100, this to be doubled in the event of a subsequent offense.

Article 46.—In zones not having a sewerage system, the cesspools shall be kept in mosquitoproof condition.

Article 47.—The cleaning of all sewer mains and catch basins, in order to avoid stagnation or overflow, is obligatory.

Article 48.—Where the Service deems necessary, there shall be affixed a "notice" indicating the dates of inspectors' visits, the party responsible being required to preserve this document.

Article 49.—Water containers on all boats shall be kept mosquitoproof by the means approved by the Service.

Section 1.—The parties responsible for the use of containers which are not kept in the above-mentioned condition shall be punished by a fine of from $2.50 to $25, this to be doubled in the event of a subsequent offense.

Article 50.—The use of old automobile tires as fenders on the sides of watercraft shall be permitted only when the holes made in them are not less than an inch and a half in diameter and not more than twenty centimeters apart so that they cannot retain water.

Article 51.—The immediate notification to the Service of all definitely ascertained or suspected cases of yellow fever is compulsory.

Article 52.—The practice of viscerotomy and the practice of making systematic autopsies of all cases of interest to the Service shall be established.

Section 1.—The Service may appoint local representatives, duly trained in the practice of viscerotomy, to whom deaths which occur within less than eleven days of the onset of sickness must be compulsorily reported without delay.

Section 2.—In places in which the Service has a representative for the performing of viscerotomy, the certificates passed by the "Official do Registro Civil" giving permission for burial in cemeteries, chapels, churches, or private grounds shall be issued only on presentation of a death certificate bearing the visa of the said representative.

Article 53.—Opposition to these measures shall entail a fine of from $2.50 to $50 and immediate action by the police authorities who shall order immediate and compulsory autopsy or viscerotomy.

Article 54.—Duty of notification shall devolve upon the following persons:

a. The attending or consulting physician; or, failing him, the head of the family or nearest relation who lived with the patient or suspect, or his nurse, or companion.

b. In apartment houses, the manager or person in charge, even though the notification has already been made by the physician or other person.

c. Persons in charge of commercial or agricultural concerns, colleges, schools, asylums, sanatoria, general hospitals, day nurseries, foundling or maternity hospitals, dispensaries, clinics, or like establishments harboring the patient or suspect.

Article 55.—For the purpose of these regulations, the term "Service" is understood to mean the Yellow Fever Service of the National Department of Public Health of Brazil.

Article 56.—The term "responsible party" used in these regulations refers to the person, as determined by the Service, upon whom the duty of applying the prescribed measures devolves.

Article 57.—By "viscerotomy" is understood the making of an incision in the cadaver with a view to taking specimens of any organ for the purpose of checking diagnosis.

Article 58—The Service may utilize any rule or law of the Regulations of the National Department of Public Health which is in force and is applicable to the yellow fever work.

Article 59.—Infringements of articles of these regulations to which specific penalties are not attached shall be punishable by a fine of from $1 to $10, this to be doubled in the event of a subsequent offense.

Article 60.—All the provisions of these regulations, as well as the penalties laid down, shall be applied whenever necessary for the operation of the Service throughout the national territory.

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